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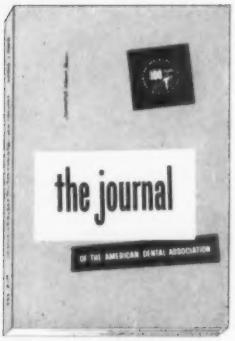
the journal

OF THE AMERICAN DENTAL ASSOCIATION



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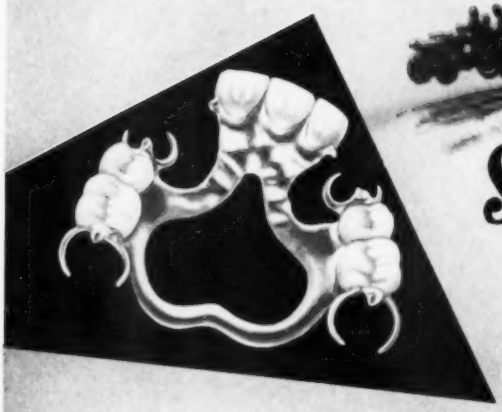

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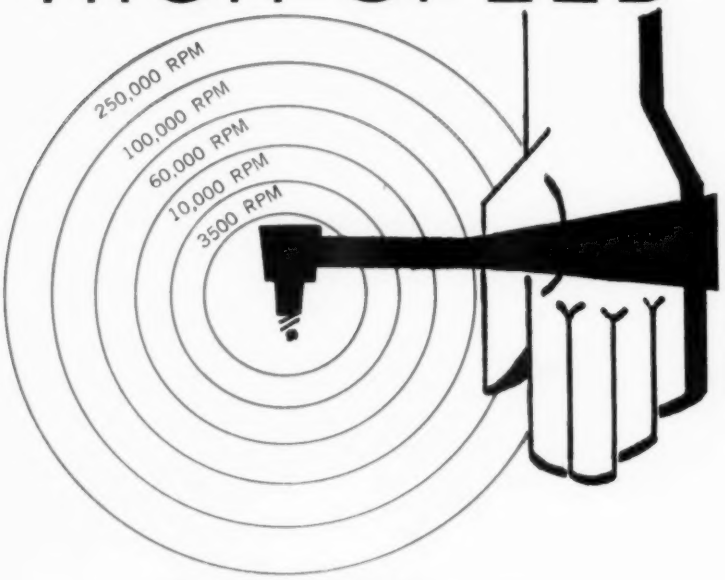

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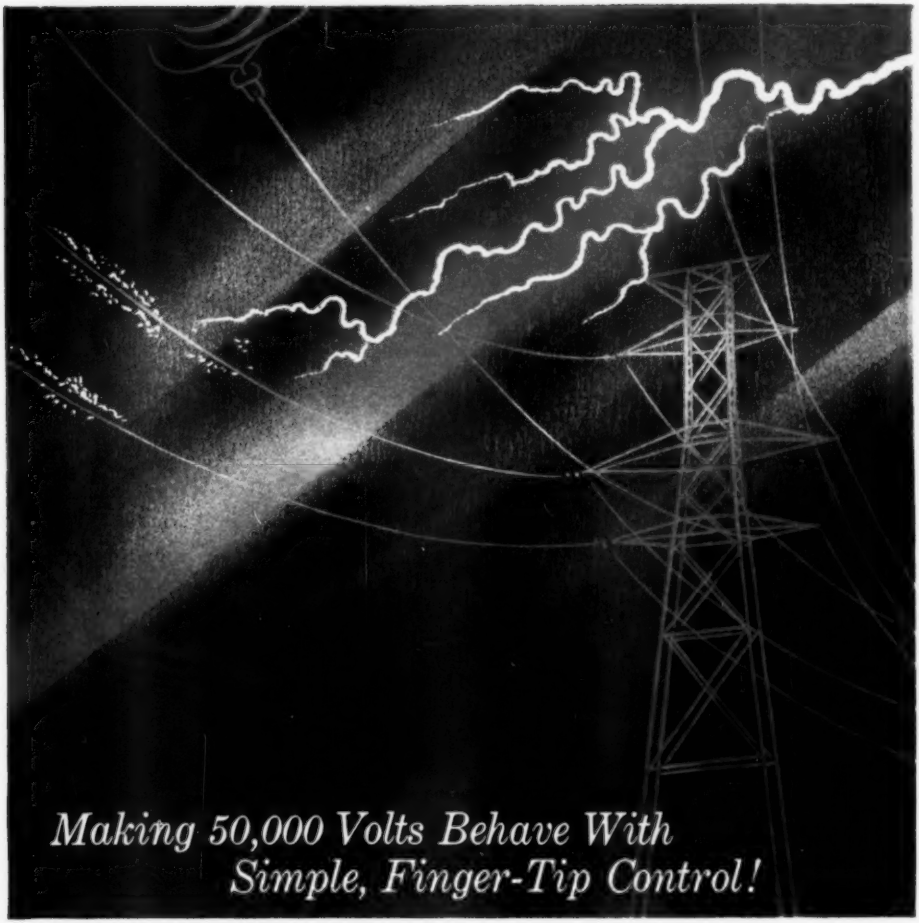

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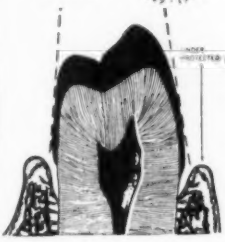

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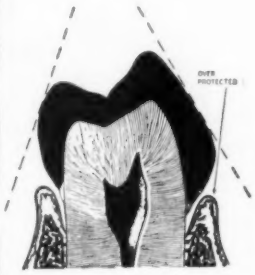

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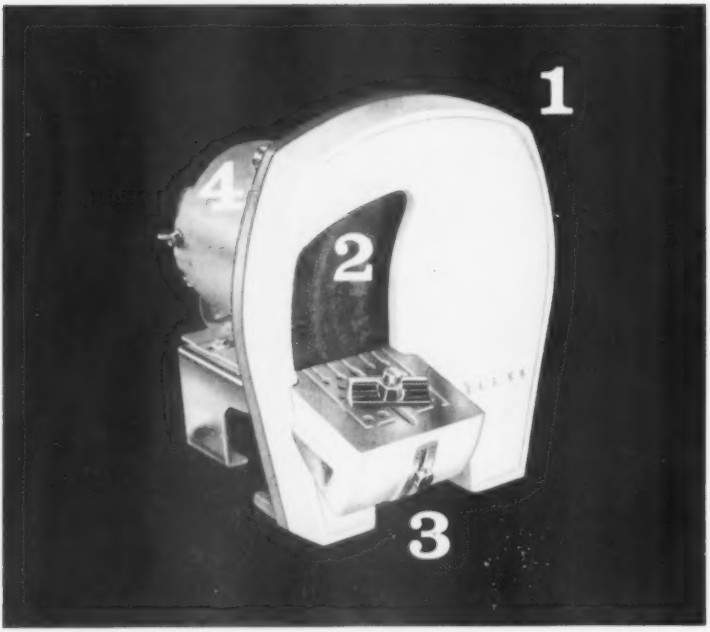

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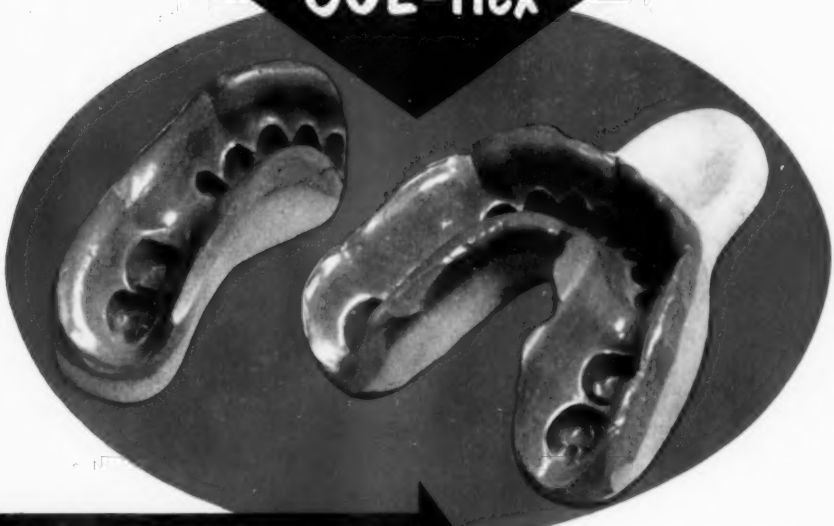

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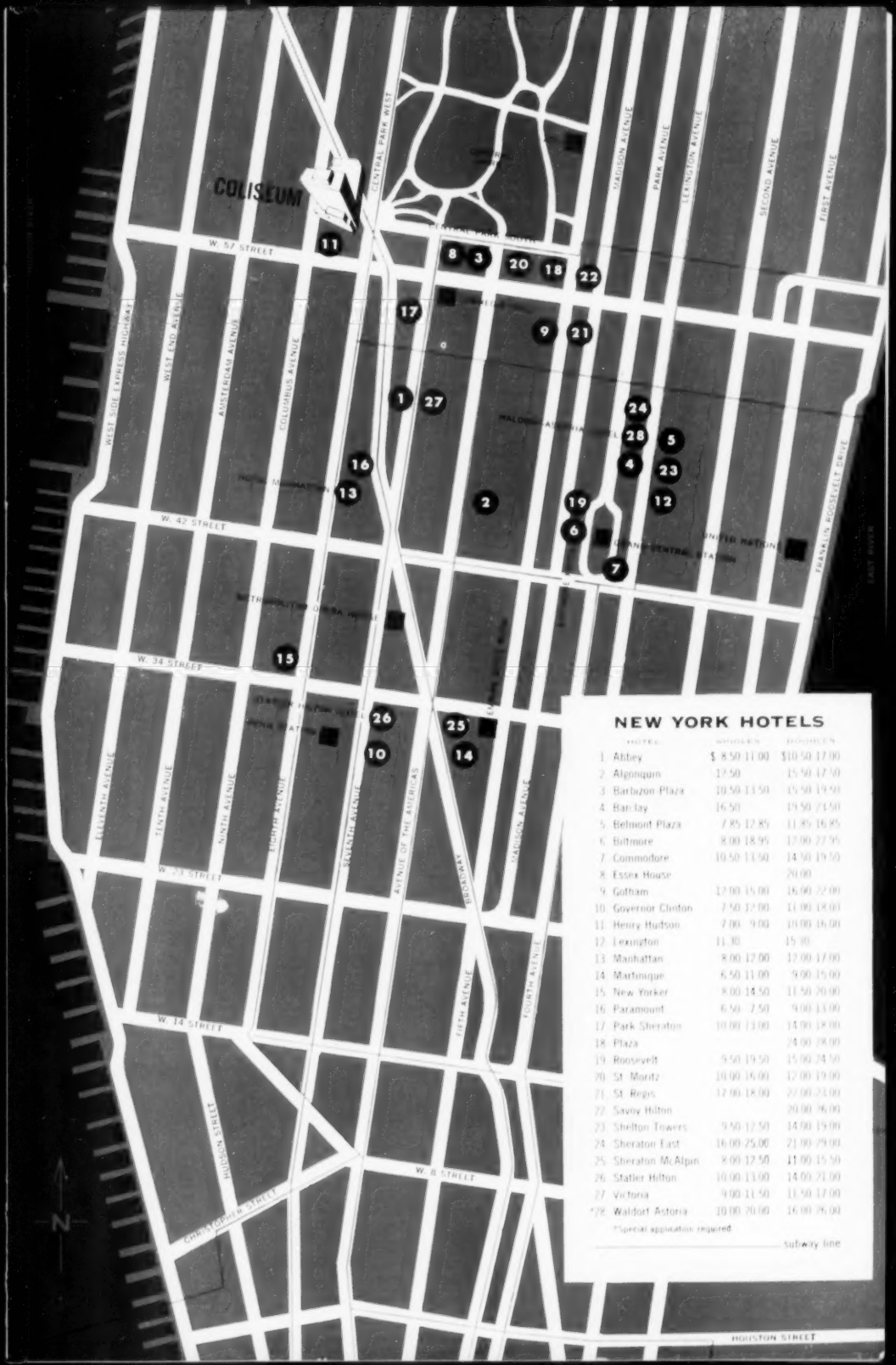

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the Journal of the American Dental Association

The control of bleeding

E. Cheraskin, M.D., D.M.D., Birmingham, Ala.*

Bleeding is the result of extravascular, vascular and intravascular defects. Most commonly, bleeding is the result of a defect in the vessel wall. Hemorrhage can be controlled by local and systemic measures. Local measures include: local pressure; rest; coagulation-promoting agents; thermocautery; application of ice; local vasoconstrictors; chemical escharotic agents; antimicrobial agents and sutures. Systemic measures include: rest; whole blood, serum and plasma; plasma fractions; platelets; ACTH and cortisone; estrogens; ascorbic acid; flavones; vitamin K; toluidine blue and protamine; the adrenochromes; antimicrobial agents, and splenectomy. The diagnosis of a bleeding disorder requires a history, clinical examination and laboratory studies.

A practical comprehension of the control of bleeding requires: (1) a clear-cut definition of hemorrhage, (2) a sound appreciation of the normal mechanism of hemostasis, and (3) knowledge of the many and varied hemostatic agents and measures.

Hemorrhage becomes clinically apparent when blood escapes from a blood vessel. The big stomatologic problem is the hemorrhage which follows an injury which, under normal circumstances, would not result in undue bleeding. This sequence of events is commonly observed after the extraction of a tooth, during or after a prophylaxis or gingivectomy, with toothbrushing, or it may seemingly be unrelated to any form of intraoral insult.

MECHANISM OF HEMOSTASIS

It should be pointed out at the start that the physiologic control of bleeding is a complex, dynamic process. Only for descriptive purposes will it be dissected.

First, an injury to a small vessel leads to increased permeability and fragility (Fig. 1). Almost immediately, there is reflex smooth muscle contraction.[1] With a reduction in the caliber of the damaged vessel, blood flow diminishes and may even cease completely. Obviously, should

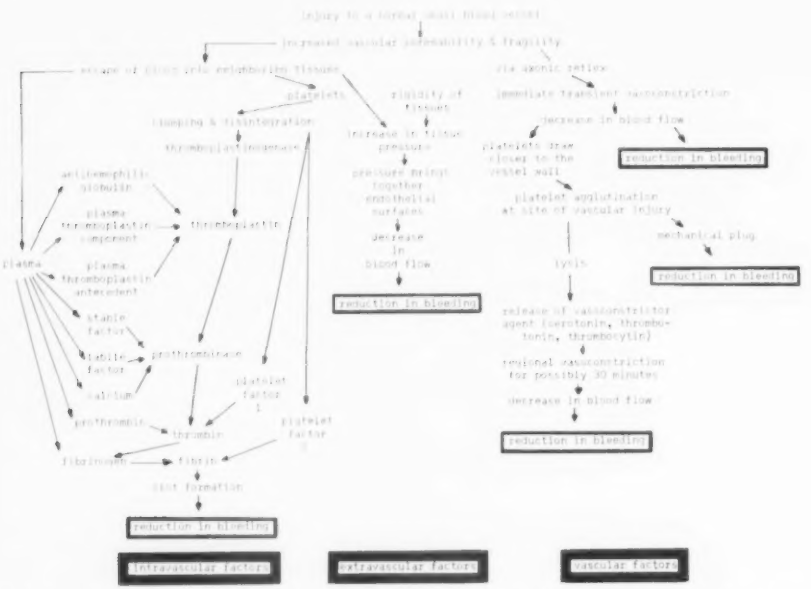

Fig. 1. • Diagrammatic explanation of the hemostatic mechanism. These may be grouped as intravascular (left), extravascular (middle), and vascular (right) factors.

such vasoconstriction not take place, there is the possibility of excess bleeding.

After vascular trauma, blood escapes from within the vessel and enters the neighboring, perivascular tissues (Fig. 1). This then means that there are now platelets, other formed elements and plasma in the extravascular compartment. The escaping platelets stick together[2] and liberate a platelet vasoconstrictor agent which has been variously designated as thrombocytin, thrombotonin and serotonin.[3] The action of the platelets at this point is twofold: (1) they become adherent to the edges of the vascular wound and act as a mechanical plug, and (2) the vasoconstrictor substance tends to constrict the regional vessels even more, thus further reducing blood flow and acting in a hemostatic fashion.[4]

At the same time, the escaping blood creates an extravascular force. This pressure, plus that which normally prevails in the tissues, produces an even greater pressure against the vessel wall (Fig. 1). Such pressure tends to compress further the blood vessels, leading to an added reduction in the caliber of the vascular lumen, even greater slowing of blood flow, and a further diminution of hemorrhage. Obviously, this particular phase of hemostasis is not as important after the extraction of a tooth as it is in other types of oral bleeding.

The escaping blood, it should be recalled, contains platelets and plasma. Therefore, the interplay of the thrombocytes and various plasma fractions represents the next step in hemostasis (Fig. 1). It is clear that there is, within plasma, antihemophilic globulin (AHG),[5] plasma thromboplastin component (PTC),[6] a possible plasma thromboplastin antecedent (PTA),[7] a labile[8] and a separate stable factor,[9] calcium, prothrombin and fibrinogen. The chart (Fig. 1) discloses the vital role of the platelets and the formation of thromboplastinogenase.

Through this mechanism, thromboplastin is made available. The thromboplastin, plus the labile and stable factors and calcium, produces the enzyme prothrombinase which, in turn, is activated by platelet factor 1 and frees thrombin from prothrombin.[10] Finally, the interaction of thrombin and fibrinogen and the accelerating effect of platelet factor 2 yield fibrin.[11] The result is clot formation.

The sequence of events (not shown in the chart) is then clot retraction, possibly some degree of clot lysis, organization of the clot and vascular recanalization.

DISTURBANCES IN THE HEMOSTATIC MECHANISM

It should be emphasized that the hemostatic process just outlined is indeed simplified. Much more is known than is here described and even more of the phenomenon requires clarification. However, it becomes abundantly clear from a composite of these oversimplified charts that the control of bleeding rests with the synchronized interplay of three factors: (1) extravascular, (2) vascular, and (3) intravascular (Fig. 1).

Extravascular Factors • The elasticity of the perivascular tissues serves two purposes: (1) it protects the vessels from damage, and (2) it resists or opposes the escape of blood from a traumatized vessel. Broadly speaking, bleeding due solely or almost exclusively to extravascular pathosis is encountered in two different types of situations: (1) when vessels course close to the surface of the skin or mucosa, and (2) when there is a loss of elasticity.

Apropos to the first situation, that is, vascular superficiality, it is of interest that a blood vessel which courses close to the periphery lacks the support of neighboring tissues on its surface side. This is especially true when the blood vessel is directed parallel to the surface. This point applies particularly to the oral mucosa because of its structural design and the customary trauma. With regard to the second point, it is well to point out that in the aged and in those with serious debilitating disorders, there is often considerable loss of subcutaneous and submucosal elasticity. This combination of extravascular circumstances may, in part, explain the ease with which bleeding occurs in some patients.[12]

Vascular Factors • There are other situations in which the extravascular tissues are normal and the intravascular blood fractions are present in adequate amounts. Still, bleeding is encountered.[13] Generally, the difficulty can be traced to pathosis in the vessel wall itself.[14] Weakness of the capillary and metarteriolar wall is the common denominator. Precisely why there should be such a fragile and permeable vascular barrier is not always clear. However, among the known causes are: (1) heredity, (2) infection, (3) nutrition, (4) hypersensitivity, and (5) hormones.

It seems clear that there can be a familial trait of vascular weakness. This possibility is well supported by the findings in hereditary hemorrhagic telangiectasia.[15] Case reports with oral bleeding are available[16] but no carefully tested studies are known to demonstrate the relationship of hereditary capillary weakness and oral bleeding.

Certainly, infection produces toxins which may exert a deleterious effect on the vascular endothelium. This mechanism is well demonstrated in the streptococcal invasion of scarlet fever, meningococcemia, and, for that matter, in any severe infection. It is likely, though the problem has not been seriously studied, that the toxins of the streptococcus and other microbes in periodontal and periapical infection may, in a similar fashion, weaken the surrounding endothelial tissue. Precisely how important this problem is, has yet to be tested under carefully controlled conditions.

Nutritional factors most assuredly play a vital role in the maintenance of endothelial integrity. For example, ascorbic acid is easily linked with the deposition and the maintenance of intercellular cement substance. There are numerous accounts in the literature[17] to show the role of ascorbic acid deficiency states in oral bleeding.

There is the chance of a hypersensitivity reaction.[18] The syndrome may take the form of an allergic response to a food, drug, or possibly even to an invading microorganism. In other words, the altered vascular permeability and fragility may signify an allergic response to microorganisms in the periodontal structures. The effect of allergy on hemorrhage is clearly shown in so-called anaphylactoid or allergic purpura. The stomatologic aspects of this problem have never been investigated under rigidly controlled experimental conditions.

Finally, evidence exists that hormones, notably those of the hypophysis (ACTH), adrenal cortex and the gonads (particularly the estrogens) play a role in vascular integrity. This is shown, for example, by the observation that a significant number of women bruise easily just prior to menses, that is, at the time when the estrogen levels are lowest.

Intravascular Factors • Hemorrhage may be due to a deficiency in the quantity or quality of: (1) platelets, (2) prothrombin, (3) fibrinogen, or (4) any one or combination of a number of other plasma fractions. Thus, in the final analysis, bleeding due to intravascular defects manifests a disturbance in one of three mechanisms which are termed: (1) thromboplastin deficiency states or hypothromboplastinemias, (2) prothrombin deficiency states or hypothrombinemias, and (3) fibrinogen deficiency disorders or fibrinogenopenias.

Hypothromboplastinemia • The role of thromboplastin in the coagulative mechanism has already been established. Its formation is impeded by a deficiency of: (1) platelets, (2) thromboplastinogenase, (3) antihemophilic globulin, (4) plasma thromboplastin component, and (5) other less well-defined plasma constituents such as plasma thromboplastin antecedent. In addition, a thromboplastin shortage may be the result of circulating anticoagulants which suppress the platelet and plasma elements so vital to the production of thromboplastin.

Hypothrombinemia • Strictly speaking, all coagulation defects, even the hypothromboplastinemias, with the possible exception of the fibrinogen-fibrin link, are the result of a defective production of thrombin. But, in its more limited connotation, hypothrombinemia is the result of a deficiency of: (1) stable factor, (2) labile factor, (3) calcium, or (4) prothrombin. Calcium plays only a minor role since the coagulative mechanism is not disturbed until the calcium level reaches a 50 per cent point—that is, a level below that for tetany.[19] The general outline is pictorially represented (Fig. 1).

Fibrinogenopenia • An absence or reduction of fibrinogen may be congenital or acquired. The congenital types are exceedingly rare. The acquired forms are associated with severe primary or secondary liver disease and are of considerable clinical importance.

INCIDENCE OF THE HEMORRHAGIC DIATHESIS

Generally speaking, the plaguing problem in the dental office is the person who reports that he has a "bleeding" tendency or the patient who is recognized as a so-called "bleeder" during or after a dental operation. More puzzling and embarrassing is the situation when the laboratory reports a normal bleeding and clotting time. The problem is then one of estab-

lishing the common cause or causes of oral bleeding.

In terms of frequency of occurrence, bleeding is most commonly the result of a defect in the vessel wall. It is therefore quite understandable why most bleeders show normal bleeding and clotting times. This was shown in a research project at the Cleveland Clinic where a group of 527 patients with a chief complaint of hemorrhage was examined extensively from a hematologic standpoint.[20] This study pointed up the fact that less than one in every four individuals showed any significant intravascular defect. Such studies, limited as they are, all suggest that bleeding is generally due to increased capillary permeability and fragility. Next in order of frequency are the extravascular problems. Last, and therefore least common, are the hemorrhagic disorders due to a disturbance in the coagulative mechanism.

These epidemiologic observations are of cardinal interest. The literature suggests that coagulation defects such as hemophilia are rare. Yet, the bulk of writing concerns itself with these disorders. Conversely, although vascular pathosis is common, little is written about it. This paradoxical situation stems from the fact that more investigative work has been done and more is known about the intravascular mechanism as contrasted to vascular and extravascular processes. This, in turn, arises from the fact that more reliable tests are available for the study of the coagulative mechanism than for determining the status of the vessel wall.

CONTROL OF HEMORRHAGE

It should be abundantly clear that the mechanism of pathologic bleeding is complex and the result of one factor, or, usually, a combination of factors. Obviously then it is difficult to imagine that there can be one or a small group of therapeutic measures capable of controlling all the hemorrhagic problems encountered in the average dental office.

Broadly speaking, the hemostatic armamentarium may be divided into two groups: (1) local, and (2) systemic measures.

Local Measures • The local measures include those agents and devices applied directly to the bleeding part to reduce or eliminate hemorrhage. These include: (1) local pressure, (2) rest, (3) coagulation-promoting agents, (4) thermocautery, (5) application of ice, (6) local vasoconstrictors, (7) chemical escharotic agents, (8) antimicrobial agents, and (9) sutures.

Local Pressure • Direct pressure to a bleeding wound is a simple and highly effective adjunct in the control of hemorrhage (Fig. 2). This is the procedure which is utilized after the extraction of a tooth when the patient is instructed to bite down on a sponge; in part here is the rationale for the use of periodontal packs. It should be emphasized, however, that direct pressure is most beneficial in those conditions in which vascular and extravascular factors play the cardinal causative role in bleeding. Thus, the local application of force is of benefit, for example, in hereditary telangiectasis, in the aged and debilitated patient, and in bleeding associated with nutritional, hormonal and allergic disorders. There are, in addition, agents available which are capable of absorbing many times their weight in blood with resultant expansion. This causes the material to swell, exert pressure and thus act as a mechanical barrier to the flow of blood. The physiologic basis, for example, of starch sponge[21] and alginic acid derivatives[22] appears to have merit in this regard but requires further evaluation.

Rest • The oral cavity is unique in that it is an area which is being subjected to constant microtraumas. Thus, under nor-

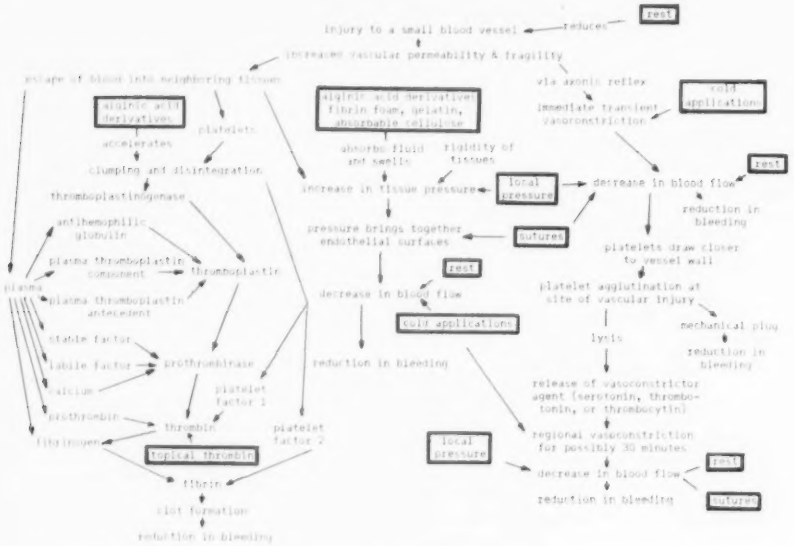

Fig. 2 • Action of local measures in the control of bleeding. Most of the measures are effective in the control of bleeding due to vascular and extravascular factors.

mal conditions, capillaries are constantly being damaged and repaired. Obviously, the reduction or elimination of such microtrauma is highly desirable when pathologic conditions are present, since capillary permeability and fragility would be reduced (Fig. 2). This fact is clinically recognized as evidenced by instructions to the patient to imbibe liquids, avoid rough foods and reduce speech.

Coagulation-promoting Agents • There is no question but that agents such as fibrin foam,[23] gelatin sponge,[24] absorbable alkaline cellulose,[25] topical thrombin,[26] and alginates[22] are helpful in the control of bleeding. These materials, combined with local pressure and rest, are highly desirable when the pathosis is of the vascular or extravascular type.

Thermocautery • The control of bleeding by cautery is helpful in those conditions in which the cause of bleeding is either in the vessel wall or extravascular. In other words, thermocautery is not desirable for the control of hemorrhage due to coagulation defects such as hemophilia. Actually, with thermocautery, the tissue is simply destroyed and thus coagulates. The end result is a mechanical plug which, for a time, can assist in the control of bleeding. However, it should be emphasized that other local measures are generally as effective if not more so than cautery.

Application of Ice • There is considerable physiologic evidence that the application of cold produces regional vasoconstriction and therefore a reduction of blood flow (Fig. 2). However, the vascular response is transient. Thus, cold applications can only be regarded as an adjunct in the control of hemorrhage due to vascular and extravascular pathosis. The effect of ice is enhanced when it is used in conjunction with other local and systemic measures for the control of bleeding.

Local Vasoconstrictor Agents • Sympathomimetic drugs are commonly applied locally for the control of bleeding. Most such preparations consist of 4 to 8 per cent racemic epinephrine. These drugs produce prompt but transitory vasoconstriction and thus reduce blood flow briefly. Unless the difficulty is within the vessel wall, its effect is insignificant.

Chemical Escharotic Agents • The use, and particularly the continued application, of escharotic agents such as silver nitrate, phenol, chromic acid and trichloroacetic acid is to be deplored.[27] They act through tissue destruction. The hemostatic effect is therefore fleeting and other, more effective measures are available.

Antimicrobial Agents • The evidence, as already pointed out, is clear that infection can produce toxic damage to the vascular endothelium with a resultant increase in permeability and fragility. Thus, it might seem that the local application of chemotherapeutic and antibiotic agents to a bleeding site would be an effective hemostatic adjunct. However, though many such anti-infective preparations are available commercially, no extensive and carefully executed studies are available to support this premise as it pertains to oral bleeding.

Sutures • Suturing may be regarded as a helpful local measure. Here, the intent is to increase the extravascular pressure with resultant compression of the traumatized vessel, and slowing of blood. The use of sutures is helpful only in hemorrhage of vascular and extravascular origin.

Conclusions • It should be clear from the foregoing account that: (1) there are a variety of local hemostatic measures available, (2) they are most efficacious when used in combinations, and (3) they are generally indicated in situations in which the bleeding is largely or exclusively due to vascular and extravascular pathoses. It follows then that these local measures alone do not play a cardinal role in the control of hemorrhage due to coagulation defects.

Systemic Measures • The systemic measures include those agents and devices administered by mouth to be swallowed, or injected subcutaneously, intramuscularly or intravenously with the expressed purpose of reducing or eliminating hemorrhage. These include: (1) rest, (2) whole blood, serum and plasma, (3) plasma fractions, (4) platelets, (5) ACTH and cortisone, (6) estrogens, (7) ascorbic acid, (8) flavones, (9) vitamin K, (10) toluidine blue and protamine, (11) the adrenochromes, (12) antimicrobial agents, and (13) splenectomy (Fig. 3).

Rest • Reduced activity, not of the bleeding part, but of the entire patient, is a most important measure, because it invites sleep and because blood pressure and cardiac output are reduced. Thus, in any type of serious bleeding, it is highly desirable to reduce intravascular pressure. This can be furthered by bed rest.

Whole Blood, Serum and Plasma • In only one condition is it clear that whole blood transfusions are necessary—when hemorrhage has been severe enough to cause anemia. In addition, a transfusion of whole blood is helpful in any hemorrhagic state in which there is a depletion of one or more of the coagulation factors. In other words, bleeding due to a coagulation defect can be aided by whole blood transfusions if enough blood can be transfused. However, it should be emphasized that whole blood, serum and plasma may be wasteful and even dangerous. For example, plasma contains about 300 mg. fibrinogen and 7 mg. prothrombin per hundred cubic centimeters.[28] Obviously, these amounts are too small to raise significantly the host's level of

fibrinogen and prothrombin in situations in which the coagulation defect is of these types. Thus, it is desirable to give the patient specific, purified fractions directed to replace the deficient fraction.

Plasma Fractions • A number of plasma components are now available and there is every reason to believe that more will become practicable in the very near future. Thus, it is possible to provide the patient deficient in plasma fractions with concentrated amounts of stable factor,[29] labile factor,[30] prothrombin,[31] plasma thromboplastin component,[32] antihemophilic globulin,[33] and combinations such as Cohn's fraction I which contains antihemophilic globulin plus fibrinogen.[28]

Platelet Transfusion • The importance of the platelets in hemostasis cannot be overemphasized. It should be recalled that the thrombocytes participate in almost every phase of the process. Thus, considerable research has yielded a significant advance in the classifications of technics for the collection, preservation and transfusion of platelets.[34] The intent, when platelets are transfused, is to deliver not only intact thrombocytes but also their products. The indication for platelets is, primarily, certain types of thrombocytopenia, especially of the idiopathic variety.

ACTH and Cortisone • These hormones have been shown to exert a nonspecific but well-defined effect on the capillary wall.[35] Though the mechanism is still open to question, it appears that these agents operate by decreasing capillary permeability and fragility. However, there is also a demonstrable shortening of the bleeding and clotting times, and stimulation of bone marrow activity.

Estrogens • Precisely how the female sex hormones act in the hemostatic proc-

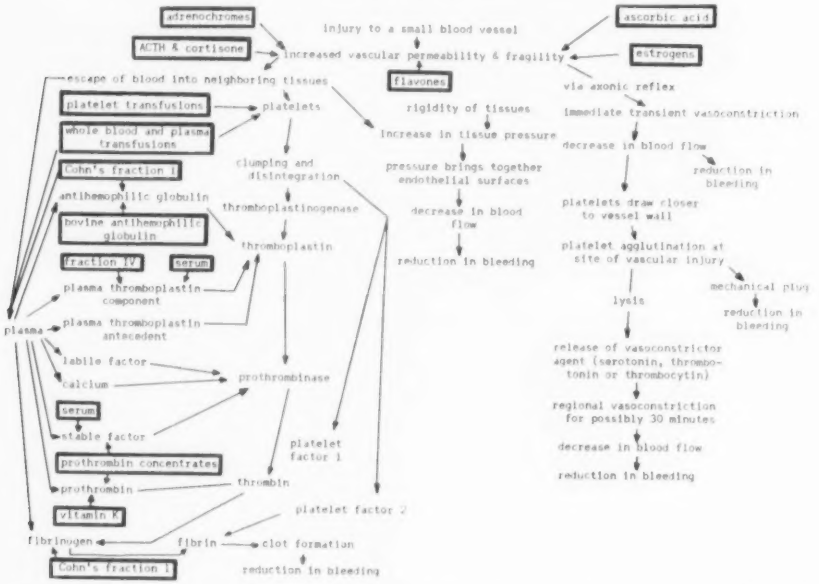

Fig. 3 • Action of systemic measures in the control of bleeding. Most of the agents are effective in the control of bleeding due to intravascular factors.

ess is still unknown. However, it is definite that they play a role. For example, it has been observed that, in women, bleeding seems to be more severe at the end of the secretory phase of the menstrual cycle. This is the period when the estrogen level is lowest and the urinary excretion of gonadotropin greatest. Other presumptions exist that telangiectatic and other types of vascular hemorrhage may be controlled with estrogens.[36]

Ascorbic Acid • The literature is replete with articles which underscore that ascorbic acid is essential for the synthesis and maintenance of the endothelial cement substance.[37] Thus, it follows that an ascorbic acid deficiency leads to increased capillary permeability. This has been confirmed by the observation that the addition of vitamin C to the therapeutic regimen often reduces or eliminates hemorrhage.[38] Most interestingly, verification that the effect of vitamin C is on the vessel wall is provided by the fact that ascorbic acid tends to reduce the hemorrhagic effect of bishydroxycoumarin at given prothrombin levels.[39]

Flavones • Flavones and their derivatives, including flavonones (hesperidin), flavonols (rutin), flavins (epicatechin) and coumarins[40] have been shown to decrease capillary permeability. However, their action is slow. Consequently, they can only be used as preventive rather than therapeutic agents.

Vitamin K • This fraction is indispensable for the synthesis of prothrombin[41] by the liver. It is often presumed that most hemorrhagic defects are the result of a vitamin K deficiency. At least, this agent is prescribed more often to dental patients than any other hemostatic drug[42] despite the fact that it is seldom indicated. Evidence in support of this statement may be found in the Australian study in which only 1 of 232 patients undergoing routine exodontic procedures showed a prothrombin level as low as 75 per cent. Vitamin K exerts its principal effect on the coagulative mechanism and specifically on the production of prothrombin. Since, as has already been shown, intravascular pathosis is not common, it follows that, in most instances, vitamin K serves no purpose in the control of oral bleeding.

Toluidine Blue and Protamine • There are situations in which hemorrhage is due to the presence of circulating heparinlike factors. In such instances, toluidine blue, a complex dye with an affinity for certain circulating anticoagulants, or protamine sulfate may serve as a satisfactory hemostatic agent.[43]

Adrenochromes • The hemostatic effect of epinephrine has already been mentioned. However, its side effects and transient action preclude its usefulness except in the most minor types of vascular bleeding. The oxidation of epinephrine produces adrenochrome, which has been reported to be an excellent hemostatic drug without the usual sympathomimetic side effects. A product of adrenochrome, monosemicarbazone in combination with sodium salicylate, is presently available for oral and intramuscular administration. It is claimed that its principal effect is decreasing capillary permeability.[44] However, its clinical usefulness must await determination by more carefully controlled studies.

Antimicrobial Agents • Mention has already been made of the local application of anti-infective drugs such as the sulfonamides and the antibiotics. Once again it is well to underscore the fact that invading microbes or their toxins or both can damage the vascular wall and so increase permeability and fragility. However, there is still no well-defined experimental study in stomatology to show that bleeding can be controlled with the use of antimicrobial agents.

Splenectomy • The precise role played by the spleen in the hematopoietic mechanism is still unknown. In recent years the term hypersplenism has received renewed attention to suggest that one or more splenic functions may be overactive. Such overactivity may eventuate in a reduction of erythrocytes, leukocytes or platelets. Of particular importance to this discussion is the possibility of a platelet reduction with its attendant hemorrhagic dangers. Therefore, there are situations, admittedly uncommon, where splenectomy is indicated.

DIAGNOSIS OF BLEEDING PROBLEMS

A diagnosis of any type of disorder, and therefore of a bleeding problem, can be reached only by: (1) the history, (2) the clinical examination, and (3) laboratory investigation.

History and Clinical Examination • It should be quite clear from an examination of the diverse origins of bleeding disorders that symptoms and signs may appear in any of the organs or systems of the body. For example, in the case of chronic, minimal bleeding, anemia is a likely sequela. The result is a reduction in the oxygen-carrying capacity of the blood. Thus, the patient complains of easy fatigability, restlessness, nervousness, dyspnea and general malaise; pallor and other evidences of chronic debilitation can be observed. These symptoms and signs are part and parcel of hundreds of syndromes and therefore are not pathognomonic of any one disorder.

There are some few symptoms and signs, however, which should alert the examiner for a possible hemorrhagic diathesis. These include: (1) ready bleeding after simple cuts and bruises such as during shaving, (2) easy bruisability, (3) a story of a bleeding tendency in other members of the family, (4) oral bleeding with minimal trauma such as with toothbrushing and eating.

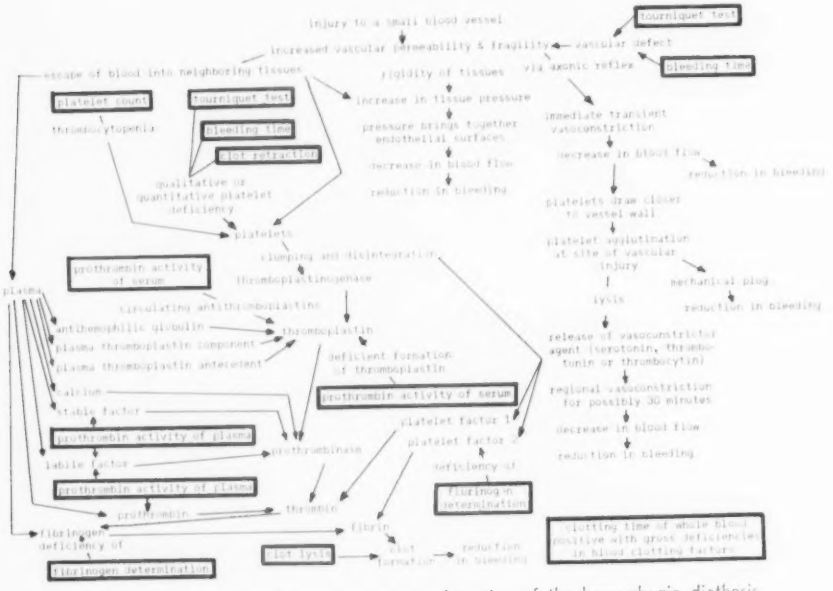

Fig. 4 • Significance of screening tests in detection of the hemorrhagic diathesis

Laboratory Examination • The most commonly employed laboratory tests for the detection of a hemorrhagic disease are the bleeding and clotting times. It is not intended in this report to analyze in detail the biochemical basis for these tests. However, the general statement can be made that if either or both of these tests prove positive, there is the strong possibility of a hemorrhagic disorder. On the other hand, if the bleeding or clotting times or both are within normal limits, and this is much more often the case, the possibility of a bleeding tendency cannot be eliminated. Thus, the question which must be answered is what laboratory tests should be performed in order to establish the presence or absence of a bleeding tendency.

Stefanini and Dameshek[27] recommend a battery of screening procedures which they insist should be carried out on every potential "bleeder" (Fig. 4). By means of these nine tests, most patients with a bleeding diathesis can be detected and even grossly classified. All of these procedures, collectively, require about 8 cc. of blood. Most of these tests, with the exception of clot lysis, can be completed within a two hour period.

SUMMARY

1. Physiologic hemostasis involves the delicate interplay of reflex muscle contraction, the release of a platelet vasoconstrictor agent, extravascular pressure, and a complex chemical reaction among a number of plasma and platelet fractions.

2. For diagnostic purposes, bleeding may be regarded as the result of extravascular, vascular or intravascular defects or all three.

3. Studies on the incidence of bleeding suggest that defects in the vessel wall itself probably represent the most common causes of hemorrhage.

4. A host of local and systemic measures are available for hemostasis. Generally, a combination of measures produces the most desired result.

5. The diagnosis of a bleeding diathesis depends on a careful history, clinical examination and, most important, laboratory studies.

6. For screening purposes in any instance of bleeding, it is recommended that the following nine laboratory tests be performed: (1) tourniquet test, (2) bleeding time, (3) platelet count, (4) clot retraction, (5) prothrombin activity of serum, (6) prothrombin activity of plasma, (7) fibrinogen, (8) clot lysis, and (9) clotting time.

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Function of the Brain • Any biological view of the function of the brain leads to an unavoidable conclusion: consciousness is not unique to man, to the primates or to other mammal species; it goes back to the roots of vertebrate history and has been progressively demonstrated in content, coloring and complexity in proportion to the evolution of the neuromuscular system in all animals. It cannot even be argued that consciousness is a unique vertebrate property—the crab, the octopus, the butterfly, the ant and many other nonvertebrate species possess sensory devices imparting to them the awareness of their world. All demonstrably engage in integrated time-binding, self-serving actions, and it must be presumed that all participate in some proportional measures in conscious awareness of themselves and their environment.—*H. W. Smith, The Philosophic Limitations in Physiology, 1954.*

Narcotics and other analgesic agents

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The doses and some of the side effects of the opiate and opioid drugs are compared. A chief disadvantage to the use of these types of drugs is the possibility of addiction; but, since much of the acute pain encountered in a dental practice is short lived, the probability of producing addiction usually is small. Two new, nonnarcotic analgesic agents—dextro-propoxyphene and ethoheptazine—may prove to be useful in dentistry.

The use of analgesic agents in the treatment of pain associated with dental ailments dates back many centuries. Throughout recorded history and down to the present time, opium and its derivatives have been of primary importance for relief of pain regardless of its origin.

Within the past quarter century, the use of substitutes for the opiates has become increasingly important. The source of raw opium, *Papaver somniferum*, is grown commercially only in Asia Minor, China, Egypt and the Balkans. Consequently, the supply in this country of the more potent analgesics such as morphine, codeine, and others, is not very dependable at any time. In the event of a nationwide emergency, the reserve stockpile of opiates here has been estimated as adequate for merely a few months. Every dentist should familiarize himself with the pharmacology of the opioids, a class of synthetic compounds with analgesic properties comparable to the opiate derivatives.

The introduction of the opioid drugs was a result of research directed at preparing more effective analgesics with less profound side effects than those produced by morphine and its related compounds. Attempts to improve these agents by alteration of the morphine molecule were discouraging. These semisynthetic derivatives were either less effective, more dangerous to use, or the addicting liability so great that their use was unsound from a clinical point of view. The most encouraging degree of success has been achieved by the chemical synthesis of the opioid analgesics such as meperidine hydrochloride (Demerol hydrochloride), methadone hydrochloride (Dolophine hydrochloride), alphaprodine (Nisentil), levorphanol tartrate (Levo-Dromoran tartrate), and anileridine (Leritine).

The synthetic analgesic agents possess many of the undesirable side effects of morphine, the standard for comparison of these drugs. The more important of these are: addiction; tolerance; depression of the higher centers in the central nervous system; depression of respiration; excitation of the vomiting center in the medulla; increase in cerebrospinal fluid pressure; decrease in auditory and olfac-

tory acuity; constriction of pyloric and ileocecal sphincter muscles; constriction of the ureter, common bile duct and smooth muscle tracts; vasodilation of the capillary bed.

A comparison of the doses and some of the side effects[1] of the opioid and the opiate drugs is shown in the table.

The possibility of addiction to morphine and its derivatives is well known. According to Faucett,[2] a normal person may become addicted to morphine within a three week period when the morphine is given in doses of 15 mg. every four hours. The opioids, likewise, are habit-forming drugs, and psychic and physical dependence may follow the administration of analgesic dosages over a sufficient period of time. The amount of any drug necessary to produce addiction is dependent on many predisposing psychological and physiological factors, as well as the amount and frequency of administration.

Narcotic addiction is not to any one particular drug. Habituation to any one of the opiates may be transferred by substitution of the opioids, with little or no change in psychic or physical dependence. Intense withdrawal symptoms occur when administration of opioids is discontinued in a narcotic addict.[3]

Many investigators[1,4] have substantiated the observation that cross addiction occurs with opiate and opioid analgesics. Consequently, in the management of chronic pain, one narcotic agent cannot be substituted for another to prevent addiction.

Attempts to retain the analgesic property of narcotic drugs and yet selectively abolish addiction, tolerance and respiratory depression, have been disappointing.[5-7] In these studies, various amounts of opiate and opioid antagonists were added to the narcotic drugs before administration. The results in much of this work indicate that analgesia, too, is abolished to a large extent. Hamilton and Cullen[5] observed some protection against respiratory depression when these combinations were used in conjunction with general anesthetic agents. This deserves further investigation for possible application in dentistry.

The development of tolerance is closely associated with the development of addiction to narcotic drugs.[3] A person to whom the opiate drugs have been given for a sufficient period of time begins to develop a decline in his usual depressant and analgesic response. Consequently, the dose of the drug must be increased accordingly, in order to produce a desired effect. Cross-tolerance occurs between morphine and the other narcotic drugs.

The profound depression of respiration produced by morphine deterred many dentists from using this drug clinically in the control of pain. Other undesirable side effects increased the aversion to these types of potent analgesics because the treatment of the depressive states was ineffective to a great extent. Since the introduction of the opiate antagonist, nalorphine hydrochloride, this disadvantage of morphine no longer exists. For the control of pain associated with dental disease or after dental treatment, codeine has proved to be adequate in most cases, and is frequently preferred because it produces a minimum of respiratory depression.

In the opiates and the opioids, depression of respiration is the primary hazard in larger clinical dosages. When death results from the effect of the potent narcotic analgesics, it is caused by profound respiratory depression.

Both the opiates and the opioids produce a depression of the higher centers in the central nervous system. Quantitatively, the degree of depression varies with the individual drugs. Euphoria, mental sluggishness, sleep and decreased activity usually follow the relief of pain. Little or no significant effect has been seen on the autonomic nervous system.

In the spinal cord, responses to these types of drugs vary from depression of activity to signs of stimulation. Morphine

Table • Comparison of opiate, opioid, and new nonnarcotic analgesic drugs

	Average adult dose	% Increase in pain threshold	Duration of effect	Principal use	Possibility of addiction	Effect on respiration	Effect on central nervous system	Effect on gastro-intestinal tract
Opiate analgesics								
Morphine sulfate	8–20 mg. I.M., I.V., oral	70–90	3–6 hours	acute, chronic, severe pain	marked on prolonged use	depression great in large doses	marked sedation euphoria	marked spasmogenic effect
Dihydromorphinone hydrochloride (Dilaudid)	1–4 mg. I.M., I.V., oral, rectal	100	1–4 hours	acute pain of short duration	greater than morphine	same as morphine	less sedation euphoria	less spasmogenic effect
Methyldihydromorphinone hydrochloride (Metopan)	3 mg. oral	100	3–6 hours	intractable pain of malignancy	less than morphine	less than morphine	mild sedation euphoria	less than morphine
Codeine phosphate Codeine sulfate	15–60 mg. subc., I.M., oral	50	2–3 hours	moderately severe pain	small	antitussive but little depression	little sedation euphoria	less nausea, vomiting
Opioid analgesics								
Meperidine hydrochloride (Demerol)	50–100 mg. I.M., I.V., oral	60	2–3 hours	moderately severe pain	less than morphine	less potent; no cough suppression	less sedation euphoria	spasmolytic; more like atropine
Methadone hydrochloride (Dolophine)	5–10 mg. oral—not parenteral	100	4–10 hours	severe pain of long duration	much like morphine	same as morphine	less sedation euphoria	less than morphine
Alphaprodine hydrochloride (Nisentil)	20–60 mg. I.M., I.V., oral	100	1–2 hours	rapid short-acting analgesic	less than morphine	less than morphine	more like meperidine	less than morphine
Levorphanol tartrate (Levo-Dromoran)	2–3 mg. I.M., I.V., oral	100	5–6 hours	same as morphine	like morphine	like morphine	like morphine	less spasmogenic than morphine
Anileridine phosphate or dihydrochloride (Leritine)	25 mg. I.M., I.V., oral	100	5–6 hours	moderate to severe pain	like morphine	more like meperidine	less than morphine	less than morphine
New nonnarcotic agents								
Dextro-propoxyphene hydrochloride (Darvon)	30–60 mg. oral	50	2–4 hours	moderately severe pain	none	antitussive; much like codeine	like codeine	probably spasmolytic
Ethoheptazine citrate (Zactirin)	75 mg. oral	50	2–4 hours	moderately severe pain	none	no cough suppression	no sedation or euphoria	little or no effect

produces an increase in spinal fluid pressure, and consequently should not be used in the emergency treatment of traumatic injuries to the head or spine.

A decrease in the acuity of the sense organs such as hearing and smell is often observed after the administration of these drugs. Excitation of the chemoreceptor trigger zone in the medulla provokes vomiting.[3] That narcotic drugs may influence vestibular activity is suggested by the observation that a much higher incidence of nausea and vomiting occurs in the ambulatory than in the nonambulatory patient.

The opiate and some of the opioid drugs are spasmogenic to the gastrointestinal tract. The pyloric and ileocecal sphincter muscles become constricted and constipation results. One of the opioid drugs, meperidine, has the opposite effect by producing relaxation of these muscles. Likewise, the effect on the smooth muscle tracts such as the ureter and common bile duct may be either spasmogenic or spasmolytic. Morphine may actually precipitate severe pain by constriction of the ureter or common bile duct around a renal calculus or a gallstone. On the other hand, these drugs may produce dilation of other structures such as the capillary bed.

From the foregoing observations, one may conclude that the opiate and opioid drugs possess some similar and some dissimilar pharmacological actions. Some of the side effects may be desired along with the property of controlling pain; others may contraindicate the use of the drugs under certain circumstances. In the management of severe pain, good clinical judgment plus a knowledge of the opiate and opioid drugs will produce the desired analgesia with a minimum of undesired side effects.

OPIATE AND OPIOID ANTAGONISM

From 1941 to 1944, many investigators reported on the properties of nalorphine hydrochloride, a compound closely related chemically to morphine. This drug was found to reverse completely the sedative, depressive, and even the analgesic effect of the opiate derivatives. Several years later, levallorphan (Lorfan) was described as an antagonist to the effects of the opioid analgesics, such as levorphanol. More recent observations in animals and man have demonstrated conclusively that both nalorphine hydrochloride and levallorphan possess the remarkable capacity to reverse or antagonize rapidly all of the pharmacological actions of the opiate as well as the opioid analgesic drugs.

Nalorphine hydrochloride and levallorphan are ineffective in the prevention or treatment of psychic and physical dependence. These agents will provoke severe and serious withdrawal symptoms within a matter of minutes in a narcotic addict. Except in emergency situations, the administration of narcotic antagonists should be limited to the hospitalized patient, under the supervision of those who are thoroughly familiar with the management of the abstinence syndrome.

Despite the efficiency of the antagonists, the possibility of addiction to these types of drugs still exists, and remains one of the chief disadvantages of their use in alleviation of chronic severe pain. Since much of the acute pain encountered in a dental practice is usually short lived, the probability of producing addiction is usually small. In his management of severe pain over a prolonged period of time, however, the dentist must give careful consideration to the selection of appropriate drugs which will preclude the development of addiction symptoms.

The opioid drugs, like the opiates, are subject to the provisions of the Harrison Narcotic Act.

NEW NONNARCOTIC ANALGESICS

Recently, the profession has witnessed the birth of two new nonnarcotic analge-

sics which, in time, may prove to be useful in dentistry: dextro-propoxyphene and ethoheptazine.

The release of a new drug is not a particularly epoch-making event. However, the attempt on the part of chemists, pharmacologists and clinicians to introduce a potent, non-habit-forming analgesic to substitute for one of the opiates is certainly significant. No satisfactory substitute for codeine has been found up to this time. Whether or not these agents will withstand the test of time and additional clinical trial cannot be immediately known.

Dextro-propoxyphene • Dextro-propoxyphene is a new synthetic analgesic devoid of the characteristic side effects of the opiates and opioids. In the preclinical and clinical trials of this drug over a two year period, investigators have shown that it is entirely free of the addiction liability. Gruber[8,9] has shown that it is equivalent to codeine in the control of pain.

Dextro-propoxyphene is given alone or in combination with other drugs, and is effective by oral administration.

Ethoheptazine • Another potent nonnarcotic analgesic, ethoheptazine, has been released to the profession recently. This agent, too, has been under extensive clinical investigation as a substitute for codeine in the control of moderately severe pain. As with the aforementioned analgesic, this agent appears to be free of the undesirable side effects of the narcotic drugs.[10] Ethoheptazine has been studied for specific application in the field of dentistry,[11] and appears to be about as effective as codeine for the control of pain associated with dental surgical procedures.

In doses of 100 mg. in combination with aspirin, ethoheptazine possesses approximately the analgesic effectiveness of codeine 30 mg.

Both dextro-propoxyphene and ethoheptazine appear to be true analgesics with relatively few side effects and a wide margin of safety. They fail to support psychic and physical dependence when substituted for narcotic drugs in the addict. These compounds appear to be sufficiently effective analgesic agents to be used as a substitute for codeine and meperidine. Further clinical verification will be necessary before the actual effectiveness of these drugs can be well established.

A complete discussion of each narcotic analgesic listed in the table is not within the scope of this paper. Reference to the usual reliable sources of information will provide the reader with complete information on the pharmacology of these drugs.

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Occlusion in operative dentistry

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When the influence of occlusion is appreciated, even a simple restoration in a tooth becomes important. Contours, contacts, margins and occlusal form must be observed for all fillings and restorations if physiologic occlusion is to be attained and maintained. Harmony of centric occlusion and centric relation is the most important factor in the maintenance of oral health.

Since there is some disagreement in terminology and in the definitions of the word occlusion and the term operative dentistry, it is expedient that the writer's concepts be stated at the beginning of this paper. Operative dentistry as defined by the writer is any operation in the mouth which attempts to restore a missing part of the crown or root of a tooth, the entire crown, or one or more missing teeth so long as the restorations are fixed and become an integral part of the tooth or teeth involved. Restorations which correct occlusal relations of malformed or malposed teeth are also included in this concept if they become a fixed part of the patient's dentition.

Occlusion in dentistry has two meanings. The word is used to describe the static relation of the jaws when the occlusal surfaces of the teeth are in maximum contact. When the casts of an upper and lower arch are placed in maximum occlusal contact, the expression "look at the occlusion" is very common.

The second meaning carries the connotation of movement and is by far the more important. In this sense, occlusion may be defined as the moving points of contact of the mandibular and maxillary teeth during all the phases of the chewing cycle. The movement is dictated by the temporomandibular joints, activated by the muscles of mastication, and influenced by neuromuscular patterns and cuspal interdigitation.

CONCEPTS AND ATTITUDES

The dentist's attitude toward occlusion in operative dentistry will depend largely on his knowledge of the subject and his understanding of the role that it plays in attaining and maintaining mouth health, along with his personal evaluation of what constitutes the best in dental health services. He may be a filler of holes and spaces, with no knowledge or interest as to why his patients' mouths are not in a healthy state or why they lose their teeth. He may also be the type of dentist who insists on an elaborate and complete oral and physical examination before the placement of the simplest restoration.

A practical question is the type of examination that should be made when apparently the patient needs only rela-

tively simple operative procedures. Are bitewing roentgenograms sufficient? Should study casts be made, and should they be mounted correctly in the hinge position on an anatomical articulator for the purpose of making an accurate occlusal analysis? Should the patient be referred to a physician for a complete physical examination? Is psychiatric treatment needed? What are the economic aspects of the situation?

The answers to these questions depend on three factors. The first factor is the knowledge and attitude of the dentist. Is he interested only in the relief of pain and the mechanics of a good restoration? Or does he understand and appreciate the importance of establishing and maintaining physiological function? Does he know how to make an accurate occlusal analysis? Does he understand the relation between functional demand and metabolic rate? Is he able to determine the influence of systemic factors and emotional disturbances on the problem at hand?

The second factor is the attitude of the patient. Does he now or can he be educated to appreciate the health, comfort, cosmetic and psychic values of a clean, healthy, normally functioning stomatognathic system? Or does he want only relief of pain and the ability to masticate food with either natural or artificial dentition?

The third factor to be considered in the answer to the previously mentioned questions is the economic requirements of the proposed diagnosis and treatment. To many in the practice of dentistry, economics is a sordid word, something never to be mentioned in a scientific paper, but whether the dentist likes it or not, it exerts a large influence on his concepts of dental practice.

Some of the most accurate diagnostic and restorative procedures are of necessity expensive, and are therefore beyond the financial ability of many people. To recommend them to such patients would be unjust to the patient and unfair to the dentist. This means that in many instances compromises must and should be made. If these compromises are to be intelligent and of the greatest benefit to the individual patient, they must be based on an ideal.

The dentist should have a working knowledge of all the necessary steps and procedures in a complete oral and physical examination and diagnosis. He should be able to evaluate his findings and, considering all the factors involved, execute the best treatment for each patient without any consideration of the economics of executing it. Ideally every patient should have this thorough and complete diagnosis and treatment, but compromises must often be made. If, however, the patient is to receive the greatest benefit, any compromise should be made only with the full knowledge of where and why it is being made and the relation between the ideal and the compromise diagnosis and treatment. Obviously, this can be achieved only if the dentist understands and can apply the ideal procedures.

The cry is often heard for a diagnostic procedure, a treatment or a technic that is "simple and practical." This is certainly a worthy objective, but let it be remembered that a simplified procedure which ignores essential requirements is certainly not practical from the standpoint of the patient. A sad commentary on many so-called compromises is the fact that the patient often spends more money to lose his teeth than it would have cost to keep them.

To develop a scientific understanding of the importance of occlusion in operative dentistry requires an effort in time and study above and beyond that usually exhibited in the average dental practice. A person sees only what he knows. Destructive influences of abnormal occlusal patterns and their pathologic sequelae go unnoticed for the simple reason that the dentist does not recognize what he sees.

For him the condition does not exist. It seems therefore that the first step in the development of an appreciation of the importance of occlusion is an increased knowledge of dental anatomy and oral physiology.

KNOWN FACTORS OF OCCLUSION

Whenever there exists a lack of complete knowledge, differences of opinion always exist. In the light of present knowledge, the following factors and influences in the problem of occlusion seem to be true.

First, and perhaps most important, is the influence of the temporomandibular joint. The mandible is a horseshoe-shaped bone with two joints on each end. Every position which the mandible can assume and every path that it follows is dictated and limited by the temporomandibular joints. It seems strange that this should be such a mystery, as it is generally accepted that all other joints limit and control various bodily movements. It is not logical therefore to conclude that the temporomandibular joints are an exception.

If it is accepted that the joints rather than tooth cusps are the dictators of mandibular positions, then an abnormal form and position of cusps are antagonistic to mandibular paths of motion as dictated by the temporomandibular joints. If the joint would permit the mandible to assume any position without injury to itself or the supporting structures of the teeth, then any type or form of operative or restorative dentistry would suffice. The incidence of temporomandibular joint disturbance and the vast amount of periodontal destruction should convince the most skeptical that the influence of the joint and the necessity of cuspal harmony with its dictatorship cannot be ignored if the real goal of operative dentistry is to be achieved.

Another important factor in diagnostic and restorative procedures is the existence of a hinge axis in the condyles. This axis can be located and transferred to an instrument for the accurate study and diagnosis of occlusal patterns. Casts mounted on any instrument without the hinge bow transfer reveal little of the dictating influence of the temporomandibular joints. Unless casts can be occluded by closing them on the same arc as that exhibited by the patient, erroneous conclusions may be drawn concerning existing occlusal patterns and the need for restorative procedures for the patient.

One of the most important, and perhaps least understood, factors of occlusion is the necessity of harmony between centric relation and centric occlusion. Centric relation is a mandible-to-skull relation. It is the terminal hinge position of the mandible and is the position of the mandible when both condyles are in their most posterior superior relation to the glenoid fossa. In this position the mandible opens and closes with pure rotary motion. This being true, centric relation may be determined at any normal opening of the jaws and has no relation as such to occlusal contact. It exists whether or not teeth are present, and it is the position toward which the muscles of mastication are pulling the mandible as the teeth come into contact.

If the occlusal surfaces of the teeth can be brought into maximum contact without cuspal interference as the mandible assumes its terminal hinge position, a centric occlusion exists that is harmonious with centric relation. When maximum occlusal contact is achieved before the mandible is in its terminal hinge position, a so-called "acquired" or "functional" centric occlusion is present. This relation always exerts a destructive influence on the supporting structures of the teeth or the temporomandibular joints or both. Much of the confusion about centric relation, centric occlusion, acquired occlusion and so forth apparently arises from the fact that the patient

does not and cannot chew in centric occlusion, yet a harmony of centric occlusion and centric relation is by far the most important functional relation of any healthy mouth.

An especially important occlusal factor in the field of operative dentistry is the influence of the proprioceptors in the supporting tissues of the teeth, with their resultant neuromuscular patterns. The placing of a cusp or inclined plane in a wrong position on an inlay or crown will cause the proprioceptors, as the teeth approach contact, to flash a message to the muscles of mastication to close the mandible in such a way that the offending cusp will be avoided as much as possible, and still permit the teeth to have maximum occlusal contact. Whereas this is a defense mechanism, it can be seen that an apparently simple restoration may be the important factor in establishing abnormal neuromuscular patterns of closure with their resultant malocclusion. This being true it may be argued that since cusps may cause so much trouble, why replace them? Or if they are present, why not just grind them off since, after all, if the teeth are flat, the mandible can go anywhere it wants to?

Although no cusp at all is better than a cusp in the wrong place, this does not change the fact that man has cusps on his teeth and a type of mandibular joint that requires these cusps to maintain functional equilibrium of the joint, the teeth and their supporting structures. All the paths of motion of the mandible are circular paths, and properly articulated teeth with their parabolic cusp form follow these paths as dictated by the temporomandibular joint.

The length or height of the cusps is influenced by the condyle path. A steep condyle path will require long cusps and a flat condyle path, shorter cusps. It is possible to examine the unworn cusps in a healthy mouth and estimate fairly accurately the angulation of the condyle path.

IMPORTANCE OF THE BENNETT MOVEMENT

The Bennett movement, or lateral shift of the mandible, is of paramount importance in operative and restorative dentistry, as it is this movement that determines the position and form of the cusps. This is the power movement of the mandible, the movement with which all real chewing is done.

Since it is the movement which causes the teeth to glide laterally across each other, its influence can be very destructive. If the teeth are flat, the greater the Bennett movement, the greater the friction as the flat surfaces glide over each other, with resulting lateral stresses on supporting structures. If the teeth have cusps, they must have correct position and form to harmonize with this lateral shift, otherwise the cusps will bump instead of gliding around each other as they should.

It is realized that the restoration of lost cusps to harmonious relation with their opponents calls for increased knowledge and greater skill than those needed for flat or nonanatomic restorations. It is also realized that man, being omnivorous, requires cusps on his teeth, and that flat teeth, be they worn, ground or restored to that form, remain in a state of health only if the patient's metabolic rate is equal to the increased functional demand of such an occlusion.

DESTRUCTIVE FORCE ON THE BALANCING SIDE

Careful observers have long noted that the most common undesirable initial contact as the mandible attempts to close in centric relation is the lingual cusp of an upper bicuspid. The buccal incline of an upper lingual cusp makes a deflective contact at the lingual incline of a lower buccal cusp and starts the glide which ends in an eccentric relation as the teeth come into maximum contact. Observers interested in the cause and treat-

ment of periodontal disease have noted also that the most destructive occlusal force is generally on the balancing side. This is easily understood when the dentist has a clear concept of the chewing cycle. As the mandible closes from a lateral excursion into centric occlusion on the working side, the occlusal force is directed more nearly through the long axis of the teeth and therefore does not transmit a destructive force to the supporting alveolar bone. An excessive initial contact on the balancing side produces a lateral thrust, thereby transmitting a potentially destructive force to the supporting structures. The destructive potential of this lateral thrust is so great that some students of occlusion[1] advocate that in the natural dentition there should be no contact on the balancing side during the chewing cycle.

As the mechanics and physiology of mandibular movements become more clearly understood, the correct anatomical and functional restoration of a single tooth surface becomes increasingly important. A single restoration that involves the lingual incline of a lower buccal cusp, or the buccal incline of an upper lingual cusp, can be the predisposing cause of a pathologic process which may end in the loss of the tooth or teeth involved. This improperly placed restoration may also be the trigger which precipitates a neuromuscular pattern that causes the mandible to close in an eccentric position, thus affecting all the teeth. Dentists should realize that whatever is happening during the chewing cycle on the working side, something is also happening on the balancing side, and that something is most important if mouth health is to be maintained.

IMPORTANCE OF CUSPIDS

The upper and lower cuspids are, so to speak, the cornerstones of the arch, and no arch can be considered perfect nor long maintain itself if its cornerstones are improperly placed. Cuspids wedge their way into the arch to finish the arch and close the interproximal contacts of the anterior teeth. The strategic position and great strength of the cuspids also enable them to prevent the anterior drift of the bicuspids and molars.

Properly placed or properly restored cuspids also act as defenders of the cusps of posterior teeth. By their guiding influence they prevent excessive cusp contact and guard against extra cyclic movements of the mandible. Habitual grinding of the posterior teeth is prevented if the cuspids are placed or restored in such a way that wide lateral occlusal contact is impossible.

The restoration of the lingual surface of an upper cuspid may also introduce contacts that can destroy even this very strong tooth. For example, if the anterior half of the lingual surface is not sufficiently concave from the tip of the cusp to the cingulum, this surface will interfere with the normal chewing cycle of the mandible, thus introducing a destructive lateral force.

A common error in operative dentistry is the use of some type of resin or silicate material to restore the important distal surface of a cuspid. The combined components of occlusal force tend to move the posterior teeth anteriorly. An important function of the cuspid is to prevent this movement, with its resultant malocclusion. It is therefore important that the distal surface of cuspids be restored with a metal hard enough to resist this anterior drift. Resins and silicates do not possess the necessary physical properties for this particular restoration.

The restoration of the lingual and distal surfaces of the upper cuspid offers the dentist one of the best opportunities for preventive dentistry, but it also offers him the opportunity to introduce destructive forces. His knowledge of mandibular function and occlusion together with his technical skill will constitute the deciding factors.

IMPORTANCE OF CONTOURS, CONTACTS AND MARGINS

The importance of anatomical contours, correctly placed contact points, and perfect margins for all fillings and restorations has long been recognized. It is well known that poor contours, a straight-sided crown for example, will permit the impaction of food against the margin of the gingiva, which may result in a traumatic injury to the free gingival margin and a deepening of the gingival crevice. Another, and perhaps more important reason for anatomical contours, is that they are necessary for comfortable and efficient mastication. As the food leaves the occlusal surfaces of the teeth at the end of the chewing stroke, curved buccal and lingual surfaces are necessary to shunt the food onto the tongue and into the buccal pouch so that it may be easily picked up and again placed between the teeth as the mandible goes into lateral protrusive occlusion preparatory to the next chewing stroke. If because of nonanatomical contours the food is shunted deep into the buccal pouch or onto the floor of the moth, recovery is more difficult, resulting in a changed chewing cycle. More masticating strokes will be needed with a resulting increased cuspal wear, which obviously is greater when no food is interposed between occlusal surfaces as they pass each other. Thus, it can be seen that nonanatomical contours may cause increased cuspal wear, which often is the beginning of a pattern of jaw movement resulting in a destructive acquired centric occlusion.

Periodontists insist, and rightly so, that all open contacts should be closed, and that improperly placed contacts should be corrected. They state that the forces of occlusion are such that fibrous foods are wedged into open contacts with such force that degenerative processes are instituted in the supporting tissue of the involved teeth. This fact alone justifies the necessity of properly placed contacts on even the simplest restoration that involves the mesial or distal surface of any tooth.

Another and equally important reason for closing open contacts is the fact that properly placed contacts are necessary if the integrity of the arch is to be maintained. The resultant force as two inclined planes glide over each other is in a lateral direction. The inclined planes of the cusps of the lower teeth as they glide over the inclined planes of the cusps of the upper teeth exert forces which, if unresisted, will cause the teeth to move in their supporting bone. An important resistive influence is a tight contact between all the teeth of each arch. An open cavity, a restoration with no contact, or a missing tooth destroys this protective mechanism of the arch and permits the involved teeth to drift until the lateral forces are no longer exerted. There is no more certain way of developing a traumatogenic occlusion than through the influence of drifting teeth. Thus it can be seen that a simple Class II restoration improperly contoured and having no contact could be the beginning of destructive processes which might eventually end in the loss of all the teeth.

Pathologists state that rough or deficient gingival margins on any restoration will invite secondary decay, afford a lodging place for bacteria, and constitute a mechanical injury to the gingival tissue. Not much is said, however, about the possible effect of these sequelae on occlusion. Any of these pathologic processes may cause a sore tooth, tender gingival tissue or a lack of comfort when mastication is attempted in the involved region. Neuromuscular patterns are activated which change the whole chewing pattern. One side of the mouth may degenerate from lack of function, while the other side suffers the effects of hyperfunction. Habitual unilateral mastication causes excessive cusp wear on the working side, thus aggravating the injury already present. Much the same pattern

of destruction may be anticipated when one or more teeth are missing on either side.

IMPORTANCE OF OCCLUSAL ANATOMY

Man is omnivorous; he tears his meat, shreds his vegetables, and grinds his cereals, all with the same teeth. In order to execute these various milling operations, teeth have cusps. There are no flat planes of mandibular motion, and there are no flat planes on the cusps designed by nature to harmonize with this type of motion. The appearance of flat planes on any cusp is a result of abnormal wear and is an indication of lack of harmony between that cusp and the path of mandibular motion as dictated by the temporomandibular joints.

Properly formed and properly related cusps travel around each other to masticate food efficiently and to maintain the direction of force through the long axis of the teeth. They should barely contact each other, if at all, during the chewing cycle. Wear is thus minimized and flat planes with their destructive lateral forces do not develop. This type of cusp relation is necessary if the maximum functional equilibrium is to be maintained between the joints, the teeth, and the supporting structures.

Since the height of the cusps is related to the condyle path, and since their position and form are related to the Bennett movement, or lateral shift of the condyles, and since a single cusp improperly restored can have a destructive influence on the entire mouth, ideally, the true path of mandibular motion should be measured and recorded before the placement of any restoration which involves a cusp. The ideal, however, is sometimes impractical and compromises must be made. The most common compromise is to use the mouth as an articulator, accepting the patient's cuspal interdigitation and apparent mandibular movement as a guide for any restoration. A dentist who understands mandibular motion and normal joint function may execute acceptable simple restorative procedures by this method. It is still, however, a compromise and should be recognized as such. Persons with strong alveolar bone, a good diet and a high metabolic rate will often tolerate flat cusps, cusps in the wrong place, or no cusps at all. A dentist placing restorations of this type should recognize that this too is a compromise and that his apparent success is due to favorable systemic factors of the patient and not to his unscientific procedures.

SUMMARY AND CONCLUSION

There are certain known factors of occlusion that appear to be little understood. A knowledge of the practical application of these factors is essential if even a simple restoration is to be scientifically placed. The writer has attempted to enumerate and evaluate these factors, for when the importance of occlusion in dentistry is fully understood, and therefore appreciated, even the simplest restoration becomes important. Contours, contacts, margins, and occlusal form are no longer just words, but are indicators of definite rules that must be followed if physiologic occlusion is to be attained and maintained. Harmony of centric occlusion and centric relation becomes the goal of the dentist; for when this is accomplished, he has activated the most important factor in the maintenance of mouth health and in the preservation of his patient's teeth.

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Periodontal therapy in a general practice

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The dental profession has displayed too little interest in the prevention and treatment of periodontal disease. Although periodontal disease long has been associated with late adulthood, much periodontal damage occurs in childhood. Both local and systemic factors may be involved. The well-informed general practitioner is in a better position than the specialist to support his periodontal therapy with the necessary operative procedures and prosthetic appliances. Further research is needed to determine the role of systemic factors in periodontal disease.

Relatively few general practitioners have trained themselves to recognize the incipient tissue changes associated with periodontal diseases, and as a consequence do not treat these conditions until they are well advanced and often beyond treatment. For years the profession has centered its attention on the control of dental caries. Likewise, research in the field of periodontics has been extremely limited as compared with that devoted to dental caries. Also the profession has been preoccupied with technical improvements in prosthetic appliances, whereas little thought has been given to the care of the supporting structures of the teeth. As a result, increasing numbers of teeth are being lost through periodontal diseases.[1, 2] Statistics indicate that after the middle thirties periodontal diseases account for the loss of two to three times as many teeth as dental caries.[2]

Apparently the first step in the correction of this condition necessitates a change in attitude toward the treatment of periodontal diseases. Many dentists feel that the methods thus far suggested are not effective, and that periodontal diseases are largely degenerative conditions over which they have little or no control. Actually the treatment can be just as effective as that devised for dental caries, if the same preventive approach is used that has been so helpful in controlling caries.

Consider the simple amalgam filling which is placed soon after dental decay has started. It is so much better than the most elaborate inlay or crown which would have to be made later if that minor cavity was neglected. It is infinitely better than the prosthetic appliance which would become necessary if the original cavity was neglected indefinitely and the tooth eventually lost. Periodontal diseases should be thought of from the same standpoint of treatment—that is, early and effective treatment. To do this dentists must train themselves to make more careful oral and roentgenographic examinations. If they follow this plan, they will be able to detect any trouble at the first sign.

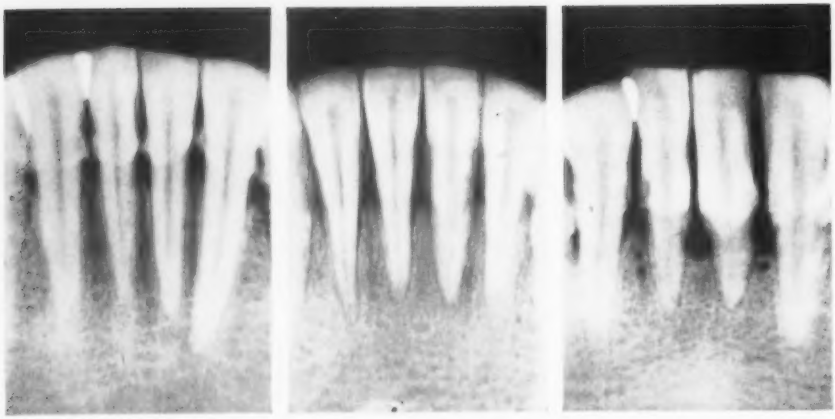

Fig. 1 • Various degrees of alveolar resorption due to progressively larger accumulations of calculus and chronic inflammation.

DIAGNOSIS

It is best to make roentgenographic projections with utmost care, and if some of them are not entirely satisfactory, to do these over again regardless of the time lost. Having obtained an adequate set of roentgenograms, the dentist should study them over a good illuminator, using a magnifying glass to bring out details. Various abnormalities should then be noted on the patient's record, just as various data are listed incidental to the oral examination.

Those who have not used this degree of care will be surprised to find that it does not take a great deal of subgingival calculus to cause marginal gingivitis, and subsequently alveolar crest resorption (Fig. 1). Likewise, they will note alveolar changes adjacent to numerous restorations—restorations that are defective at the contact point or at the gingival margin. Among their older patients, they will see various degrees of alveolar resorption because of occlusal trauma. The teeth affected may be slightly malposed, may have rather prominent cusps, or may be carrying some poorly-contoured restoration. By the same token, every patient with malocclusion is a potential patient with periodontal disease. With advancing years and alveolar bone changes, occlusal trauma is an important contributing cause of periodontitis. For this reason, as well as for esthetic reasons, malocclusion should be treated whenever feasible.

PERIODONTAL DISEASE IN CHILDHOOD

Of great significance, too, is the incidence of subacute gingivitis among children. With the exception of an occasional gingivitis, periodontal disease has long been associated with late adulthood. For many years the medical and dental professions have looked on alveolar atrophy, suppurative periodontitis, and loosening of the teeth as degenerative changes which occur in most people as they reach the fourth or fifth decade of life, and have assumed that little can be done to avert these conditions.

Rather extensive studies made during the past ten years, however, have changed this concept somewhat. Of particular interest are the investigations of Marshall-Day[3] who found a tremendous incidence of gingival disease among the ill-nour-

ished children of India, and those of Schour and Massler[4] who studied various groups in postwar Italy. In both instances the lack of essential elements in the diet, together with poor oral hygiene, had brought about gingival changes.

In a later study, Massler, Schour and Chopra[5] examined numerous children in the suburban areas adjacent to Chicago and found widespread gingivitis. Here the causes were not brought about by poverty, but by factors which had essentially the same effect. Numerous children exist on diets which are completely out of balance. They indulge in large amounts of carbohydrates, and as a consequence have little appetite for the more nourishing and substantial foods. Incidentally, they are careless about oral hygiene (Fig. 2).

These investigators and others have shown that chronic gingivitis causes progressive changes in the underlying periodontal tissues, and that such changes become more apparent as time passes. Roentgenographic examinations disclose loss of the lamina dura over the alveolar crest, and varying degrees of resorption of the interseptal bone. An interesting example of this was revealed by the examination of 500 pilots of the United States Air Force.[6] As many as 29.2 per cent had developed periodontal disease with accompanying bone loss.

TREATMENT PLANNING

In a rational approach to the treatment of any disease, consideration must be given to the elimination of causes. In many instances of periodontal disease, there are both local and systemic factors. As has been noted already, diet can play an important role, and should be taken into account concurrent with the institution of local treatment and the establishment of oral hygiene. What constitutes an adequate diet? Much has been written on this point, and many fads and fallacies have been suggested. However, a reliable source of information on dietary patterns is the Bureau of Human Nutrition and Home Economics.[7]

The ability of a person to assimilate the essential elements from a good diet is still another factor. Freedom from worry, unhurried eating habits, ample rest and moderate exercise are all conducive to health. Occasionally there is some obscure cause for malnutrition which requires searching medical analysis, but in the large majority of instances simple rules of wise living will solve the problems that arise.

In planning treatment, the dentist must consider every aspect of the case. A carefully-made set of roentgenograms and a detailed clinical examination are always prerequisites, as previously indicated. An

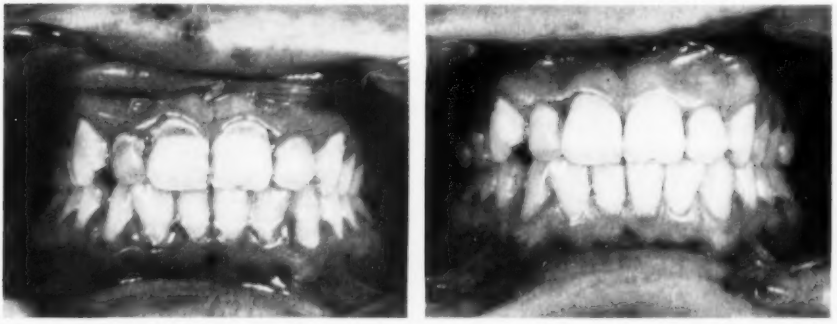

Fig. 2 • Left: Marginal gingivitis due to poor oral hygiene. Right: Improvement in gingival tone after removal of foreign matter and institution of good hygiene.

orderly procedure should then be outlined so that no phase of the treatment will be neglected. In this connection, it should be emphasized that the conscientious and well-informed general practitioner is actually in a better position than the specialist to support his periodontal therapy with the necessary operative and prosthetic restorations. Incidentally, he is the first to see beginning changes in the periodontium.

CLINICAL PROCEDURES

The scaling of teeth, though a relatively simple operation for those who have mastered the technic, is one of the most neglected in dentistry. On the one hand, there are practitioners who only superficially clean the teeth, leaving undetected subgingival calculus which eventually becomes a chronic irritant. This is one of the major causes of gingival inflammation and alveolar resorption. On the other hand, there are those who so grossly traumatize the gingival tissues and the epithelial attachment in their careless efforts to remove concretions on the teeth, that many patients have learned to dread this operation and prefer to forego regular, periodic prophylactic treatments.

The scaling process should be an orderly procedure, and instruments for this purpose should be selected carefully. By practice, as in all other fields, the dentist gains a certain facility in their use and learns which are best suited for the numerous angles presented by the various teeth. Instruments should be held with a firm grasp, and free fingers should find support on adjacent teeth, so that movements are properly directed and all undue trauma is avoided. As the presence of subgingival calculus is determined largely by the sense of touch, rather than sight, the operator should train himself to proceed in a systematic manner. With a definite plan, no areas are neglected and the gums are not repeatedly impinged on by superfluous manipulations.

After the teeth have been scaled, they should be polished carefully. The use of stiff-bristled brushes, running at high speed in close proximity to the gingiva, is certainly unwise. Rubber cups carrying a mixture of finely-ground pumice and glycerine, together with some flavoring agent if desired, are all that is ordinarily required. These cups flatten out somewhat as they are pressed against the teeth, and the edge is readily brought into the gingival crevice. Fine interproximal strips and wood points mounted in a porte polisher may be used to carry pumice to certain areas not reached by rubber cups. Polishing of surfaces adjacent to the gingiva is thus accomplished without injury to them. Various brushes may be used to advantage on the occlusal surface of bicuspids and molars.

A bland antiseptic, such as iodine solution, N.F., or thimerosal solution 1:1,000, may be applied after subgingival curettage to assist in reducing inflammation.

As a counterpart of thorough prophylactic measures, all extensive restorations should be examined closely to determine gingival adaptation, contact point, marginal ridge areas, and possible occlusal disharmony. Not infrequently restorations are placed without due regard for proper function, and unless they can be altered satisfactorily, they should be replaced.

Prosthetic appliances replacing one or more teeth should always be carefully designed and adjusted so that undue strains are not placed on the periodontal structures. The length of service of such appliances is dependent on the consideration given living tissue quite as much as on the mechanical excellence of construction.

Also, it is most important to apprise patients of the wisdom of replacing teeth soon after extraction. All dentists have observed the drifting and tipping of teeth into an edentulous space, with subsequent extrusion of the opposing teeth (Fig. 3). Widespread disharmony in both arches is thus brought about, and this is obvious-

Fig. 3 • Failure to replace teeth soon after extraction results in drifting and tipping of adjacent teeth and may initiate extensive periodontal changes.

ly one of the major causes of periodontal disease.

GINGIVITIS DUE TO INFECTION

Not infrequently an acute infectious process will spring up when oral hygiene has been long neglected, or when the resistance of the gingival tissues has been lowered as a result of general ill health. Prominent among these infections is Vincent's gingivitis, often referred to as acute necrotizing gingivitis. This disease is characterized by the formation of ulcers and pseudomembranes, and has a predilection for the interdental papillae. There is considerable fetor of the breath due to the breakdown of tissue, and the patient usually experiences considerable discomfort when eating.

Since the acute symptoms subside quickly after the use of penicillin, oxophenarsine hydrochloride, or neo-arsphenamine, a mistaken idea has developed among many patients that the disease can be cured readily, and that drug therapy is all that is necessary. Actually, thorough debridement is necessary to eradicate the disease and prevent a chronic infection which invariably destroys the interdental papillae (Fig. 4). Lyons[8] has urged debridement at the earliest pos-

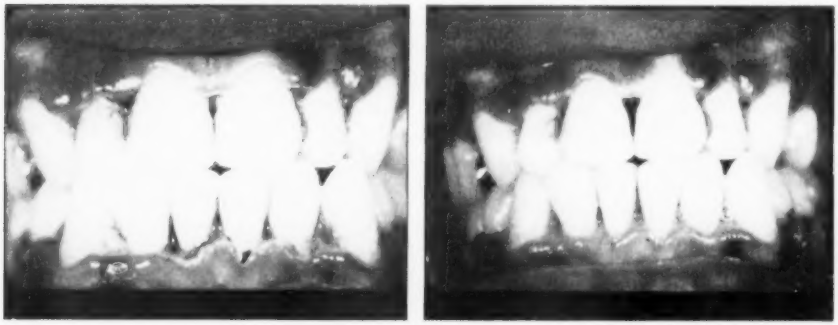

Fig. 4 • Left: Acute Vincent's gingivitis showing necrosis of interdental papillae. Right: Loss of interdental papillae invariably follows when escharotic drugs are used in treatment of Vincent's gingivitis, or when the disease has been allowed to become chronic through superficial treatment.

sible moment to abort the disease and avoid the deforming effect which it has on the interdental papillae. Sometimes it is not feasible to undertake more than superficial debridement at the first visit because of the time factor, or because the gingiva is highly inflamed and painful. In such instances, one of the aforementioned drugs may be used to allay the acute symptoms, but the eradication of all local irritants should follow shortly. Also, the patient should be kept under observation until the gingiva is again firm, pink and stippled. Obviously, careful attention to diet and home care are essential to attain this end.

HYPERPLASIA OF GINGIVA

Gingival hyperplasia is frequently found among younger patients. Poor oral hygiene, accumulations of debris in the gingival crevices, poor gingival stimulation from a lack of coarse food or the toothbrush, inadequate diet, and sometimes endocrine disturbances are factors in bringing about this condition. The gingiva is red and inflamed, the blood and lymph vessels are engorged, and the general appearance is that of neglect and indifference.

Treatment may be difficult if the condition is complicated by interproximal caries, or if the patient is uncooperative. On the other hand, recovery is often phenomenal. With the removal of the causes and the institution of good oral hygiene, the vitality of youth usually can be relied on for rapid improvement. It is therefore most important that general practitioners give these patients the care and attention that they require. There is a tendency to assume that symptoms will resolve themselves as the patient grows older and develops some pride in cleanliness and good appearance. Actually, much harm can be done to the periodontal structures when chronic irritation is left to run its course.

One of the most striking forms of gingival enlargement occurs as a side-effect of the treatment of epilepsy with diphenylhydantoin sodium. Here the hyperplasia is extreme, the enlarged gingiva sometimes covering more than half of the coronal portion of the tooth. In relatively clean mouths, the hyperplastic tissue is rather firm and is not particularly inflamed. However, in most patients the inflammatory hyperplasia is increased by accumulation of debris in the greatly deepened gingival crevices.

This condition sometimes may be corrected by conservative treatment alone. The patient's physician usually is willing to try a substitute for diphenylhydantoin sodium such as methylphenylethyl hydantoin once he is aware of the gingival changes. Subsequently, the teeth are scaled thoroughly and polished in quadrants. At the end of each visit the teeth should be isolated with cotton rolls, gently dried with compressed air, and 8 per cent zinc chloride should be applied in the gingival crevices for several minutes. To assist in capillary repair the diet is supplemented with 100 mg. of ascorbic acid three times per day, and the patient is instructed to clean the teeth after each meal. Occasionally, gingival resection is necessary to reduce extensive overgrowth (Fig. 5). However, it should be withheld until good oral hygiene has been established, and the dentist is convinced of the patient's cooperation. Numerous gingivectomies have failed and there has been recurrence of hyperplasia because surgery was resorted to under adverse conditions.

INTERRELATION OF ORTHODONTICS AND PERIODONTICS

As indicated earlier, every patient with malocclusion should be considered for treatment not only because of esthetics, but because, in all such instances, periodontal problems develop eventually. Teeth that are malaligned are difficult to clean, and food is often wedged be-

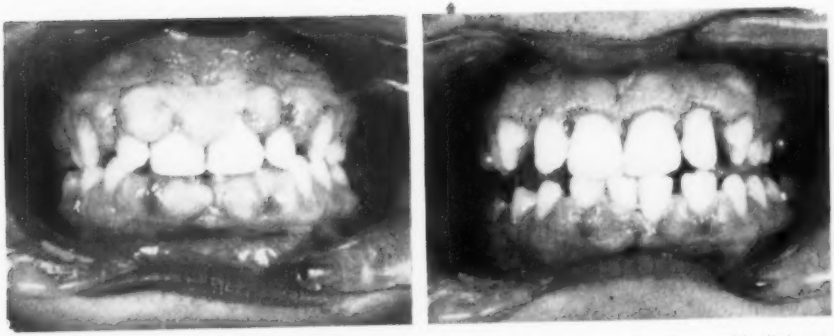

Fig. 5 • Left: Gingival hyperplasia occurring as a side effect of treatment of epilepsy with diphenylhydantoin sodium. Right: Restoration of normal gingival pattern in upper arch after gingivectomy and substitution of methylphenylethyl hydantoin for diphenylhydantoin sodium.

tween defective contact points. This initiates gingival and alveolar changes, and presently pockets are formed. Later in life, the periodontal support of those teeth which have been subjected to abnormal occlusal stress breaks down.

For those who have not had the benefit of orthodontic treatment, a compromise procedure is available. This is commonly referred to as "occlusal equilibration." Here an effort is made to distribute equally the forces of occlusion by grinding away those surfaces which make interceptive contact. Within reasonable limits this is an effective procedure, but it should be undertaken with caution, and then only after careful study of well-made plaster casts. I prefer to reserve it for those patients who have had orthodontic treatment, but who require occlusal adjustment to relieve minor cuspal interferences.

Orthodontics also plays a part in realigning teeth which may have been forced out of position by some injurious habit, or because the periodontal support has been weakened by disease (Fig. 6). A simple removable appliance, the Hawley retainer, can be modified so that it will serve as a treatment appliance to close diastemas of the upper arch. A further modification is the anterior bite-

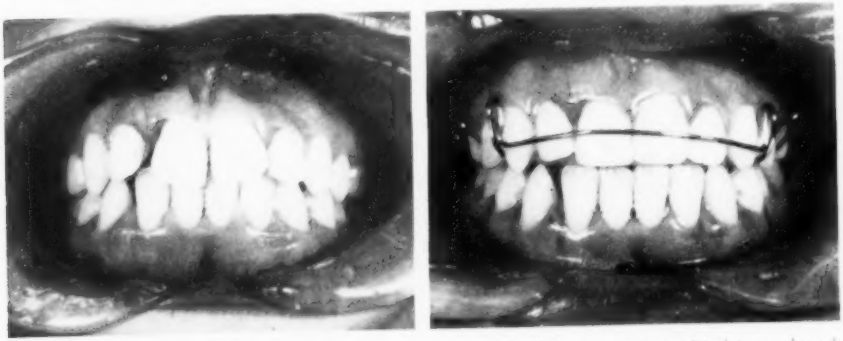

Fig. 6 • Left; Pathologic shifting of teeth often occurs as occlusal forces are transmitted to weakened periodontium. Right: As counterpart of periodontal therapy, simple orthodontic appliances may be used to realign teeth and maintain them in position.

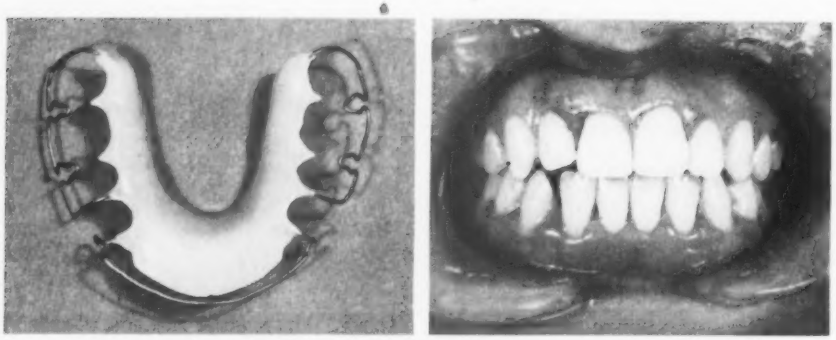

Fig. 7 • Left: Appliance used in treatment of condition shown in Figure 6, left. Right: Result of treatment of condition. Maintenance of this status usually requires wearing appliance indefinitely at night or splinting teeth with fixed appliance.

plate suggested by Gratzinger,* which makes it possible to gain vertical dimension through extrusion of the posterior teeth, as only the anterior teeth contact when the appliance is worn (Fig. 7).

NEED FOR RESEARCH

There is still much need for research in periodontics. Prominent among the problems that confront the profession are instances of diffuse alveolar atrophy which have no apparent local cause. Roentgenographic examinations of relatively young patients may disclose a startling degree of alveolar resorption. In some instances, the dentist gets the impression that virtually all of the alveolar bone is gone. Actually, there may be much more supporting tissue than there appears to be, but it is no longer radiopaque. This is borne out by the fact that occasionally a redeposition of alveolar bone is noted, and a concurrent arrest of tooth migration.

Careful studies of metabolic changes which occur incident to malnutrition and chronic disease should be made. This will require the close cooperation of periodontists with those pathologists and biochemists who have a special interest in dental problems and their ramifications.

SUMMARY

1. The dental profession displays too little interest in the prevention and treatment of periodontal diseases as compared with that given "restorative dentistry."

2. Extensive research has been carried out which indicates that much periodontal damage occurs in childhood. General practitioners, therefore, should be alert to beginning changes in the periodontium.

3. Every dentist should be aware of the importance of judiciously using certain basic clinical procedures to control periodontal diseases and prevent their more serious consequences.

4. The need for further research to determine the role of systemic factors in periodontal disease cannot be overemphasized.

*Department of applied materia medica and therapeutics, College of Dentistry, University of Illinois.

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Survey and analysis of roentgen exposure of dentists: preliminary report

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A survey was made of the radiation received by dentists in 113 Chicago dental offices with 122 x-ray machines. Although the average dentist surveyed is operating his x-ray equipment under safe conditions, individual dentists can establish a more acceptable level of personal safety by: (1) establishment of correct collimation and filtration in each x-ray machine, (2) utilization of high-speed film to reduce exposure, and (3) use of a timer cord with a minimum length of eight feet. The use of filtration reduced the machine's roentgen output by 18 per cent, and reduced the dosage to the operator by 43.4 per cent.

The current awareness of potential radiation hazards in the dental office has created a great deal of unrest and confusion among the members of the profession. Recent extensive studies[1-4] by independent researchers in the field of dental roentgenology have been significant in helping to solve this problem. However, to date, little work has been done in assessing the degree of radiation exposure of dentists, through a relatively large sampling of dental offices.

The purpose of this study was to conduct a comprehensive survey of the x-ray facilities in 200 dental offices, under actual operating conditions. This is a preliminary report of findings on 122 x-ray machines in 113 of these offices.

REVIEW OF THE LITERATURE

In a comprehensive review of the literature, English[5] indicated that many hazards may exist in dental roentgenography when personnel are not aware of the potential danger of overexposure to roentgen rays.

Budowsky and Kutscher[6] made the first significant attempt to collect data on roentgen-ray exposure of dentists. None of the 71 dentists in their study received more than the then allowable maximum dose of 0.3 r per week, but nine of them were exposed to more than

(1) Name_____ (2) Age____ (3) Yrs. in Prac._____
(4) Address_____ (5) Telephone_____

(6) Average number of days in office per week___ (7) Estimated number of working weeks per year_____ (8) Estimated number of *single* x-ray exposures per week_____
Per cent of exposures per operator:
(9) D.D.S._____% (10) Dental Asst._____% (11) Hygienist_____%
(12) Do you now subscribe to a film badge service?_____ (13) Have you ever subscribed to a film badge service?_____
(14) What brand of x-ray film do you use?_____
Check speed of x-ray film used:
(15) Slow_____ (16) Medium_____ (17) Fast_____
(18) What is your average upper molar exposure?_____/second.

(19) Brand of x-ray machine_____ (20) Model No._____
(21) Serial No._____ (22) Approx. age of machine_____ (23) Length of timer cord_____ft. (24) How far do you stand from the patient's head during exposure?_____ft. (25) Have you added any filtration?_____
(26) What kind?_____ (27) How much?_____

Fill out this sheet only if you have more than one machine.
(28) Brand of x-ray machine_____ (29) Model No._____
(30) Serial No._____ (31) Approx. age of machine_____ (32) Length of timer cord_____ft. (33) How far do you stand from the patient's head during exposure_____ft. (34) Have you added any filtration?_____
(35) What kind?_____ (36) How much?_____

(37) Brand of x-ray machine_____ (38) Model No._____
(39) Serial No._____ (40) Approx. age of machine_____ (41) Length of timer cord_____ft. (42) How far do you stand from the patient's head during exposure?_____ft. (43) Have you added any filtration?_____
(44) What kind?_____ (45) How much?_____

Fig. 1. • Radiation survey questionnaire.

the currently acceptable maximum dose of 0.1 r per week.[7]

After a survey of six typical dental offices, Nolan and Patterson[8] indicated that the facilities they found "presented hazards in a greater or lesser degree." They further emphasized the need for every possible precaution inasmuch as all operators were subject to some exposure. Data were collected from three of 32 additional machines in the same study. An average output of 178 r per minute was reported for these machines.

Fixott, Claycomb and Pflugrad,[9] in a survey of 37 machines, found an initial average output of 113.1 r per minute. When a long cone and filtration were employed, the output dropped to 10.2 r per minute.

METHOD OF PROCEDURE

A radiation survey questionnaire was mailed to a random sampling of 600 dentists practicing in the Chicago area. Each dentist was advised that he would become eligible for a survey of the radiation output of his x-ray equipment upon

completing and returning the questionnaire. The survey was conducted in two phases: (1) collection of specific items relating to operator and machine by means of the questionnaire and (2) measurement of the relative roentgen output of each machine and radiation dose to the operator.

Four teams of senior students, in the College of Dentistry, University of Illinois, (Bertram Goodhart, Stanley Hellman, Robert Hoehne, Richard Holt, Charles James, Calvin Johnson, Roland Rudnick and Edward Tye) were trained to operate the radiation-measuring equipment employed in the survey. An additional senior student (Raymond Salvino) assisted in coordinating the program.

Questionnaire • The questionnaire (Fig. 1) and covering letter were designed with the cooperation of B. Duane Moen, director of the Bureau of Economic Research and Statistics of the American Dental Association. These were mailed to each of the 600 dentists. A self-addressed, stamped envelope was enclosed to expedite the return of the completed questionnaire.

Fig. 2 • Method of measurement of relative roentgen output

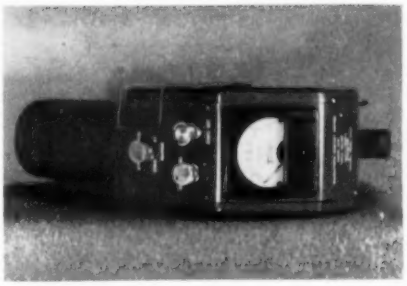

Fig. 3 • "Cutie Pie" survey meter

Radiation Measurement • The offices chosen for the survey were divided into geographical areas and a team of student surveyors was assigned to each area. Initially, the student team contacted the dentists by telephone and set up appointments for the surveys. The dentist was asked to make a patient available for a single x-ray exposure. In making the specific survey, the student surveyors examined each machine for collimation and added filtration. The dentist was questioned on the number of films used per full mouth survey and the specific location of immediately adjacent x-ray equipment.

With the patient in the chair and the dentist using the conventional 40 angulation (maxillary occlusal plane parallel to floor) for the central incisor projection, a two-second exposure was made. The relative roentgen output and the dose to the operator were measured as follows:

Measurement No. 1 (relative roentgen output) • The term "relative roentgen output" is used to denote a variation from the actual cone tip dosage, created by the interposition of the nose between the cone tip and chamber, and is to be interpreted as tissue-filtered dose.

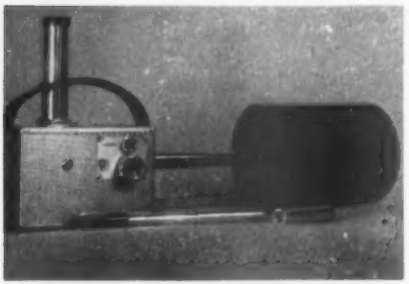

Fig. 4 • Condenser roentgen meter and chambers.

The Victoreen roentgen meter with the 25 r chamber was used. The chamber was placed along a line connecting the point of the chin and the tissue overlying the anterior nasal spine (Fig. 2).

Measurement No. 2 (dose to operator) • The "Cutie Pie" survey meter and the Victoreen r meter (with 0.025 r chamber) were employed (Fig. 3 and 4). The "Cutie Pie" survey meter and the Victoreen 0.025 r chamber were assembled as a single unit. The complete assembly was held by the operator at navel level during the exposure (Fig. 5). The operator was asked to stand in the position he normally assumed during roentgen-ray examination. The operator was instructed to read the equilibrium position of the indicator needle of the "Cutie Pie." This represented the position of the needle immediately before the exposure was terminated. When the "Cutie Pie" survey meter reading was less than 15, that reading was recorded. In all other instances, the Victoreen r chamber reading was recorded.

The approximate time per survey was five minutes.

FINDINGS

1. The average age of the 122 machines surveyed was 11.6 years. Filtration had been added to 16.8 per cent of these machines and 22.6 per cent were collimated (Table 1).

2. Whereas the average relative roentgen output of unfiltered machines was 1.74 r per second, the filtered machines showed a reduction in roentgen output of 13 per cent (Table 2).

3. Although the average timer cord length was 6.85 feet, the average operator-to-patient distance was only 4.97 feet.

4. Over 90 per cent of the dentists (average age 45.8 years) operated the x-ray equipment. Although 6.5 per cent of the dentists had subscribed to a film badge service, none was currently subscribing.

5. With unfiltered machines, the average operator dose was 0.219 mr per second. Where filtration was employed (Table 3), this dosage was decreased by 43.4 per cent.

6. The average full-mouth roentgenographic examination utilized 14 films, with an average maxillary molar exposure of 2.2 seconds. The weekly average of single exposures was 55.9.

7. The average relative roentgen output varied in the different brands of machines from 1.35 r per second to 2.88 r per second (Table 4).

8. Forty-seven dentists indicated that x-ray equipment was present in neighboring offices.

Fig. 5 • "Cutie Pie" survey meter-condenser r meter assembly.

Table 1 • Summary of radiation survey findings in 122 x-ray machines in 113 offices in Chicago

Average dose to operator (all machines)	.203	mr/sec.
Average dose to operator (filtered machines)	.124	mr/sec.
Average dose to operator (unfiltered machines)	.219	mr/sec.
Average relative r output (all machines)	1.67	r/sec.
Average relative r output (filtered machines)	1.42	r/sec.
Average relative r output (unfiltered machines)	1.74	r/sec.
Average distance from operator to patient	4.97	feet
Average length of timer cord	6.85	feet
Filtration (added)	16.8	%
Collimation	22.6	%
Average age of dentists	45.8	years
Average age of machines	11.6	years
Previous film badge subscription	6.5	%
Current film badge subscription	0	%
Average single exposures	55.9	per week
Average molar exposure	2.2	sec.
Average number of films per full mouth examination	14	

9. The evaluation of film speeds used was inconclusive because of inconsistency in reporting by the dentists.

A complete summary of the basic findings is shown in Table 1.

DISCUSSION

Although no attempt was made to differentiate between methods of filtration, several types were observed. Some machines were filtered with copper and aluminum, by the method of Yale and Goodman,[3] and others utilized aluminum only.

Machines in the 11 to 15 year old age group had the highest relative roentgen output. Older units showed a decrease in relative roentgen output with age because of tube wear. Newer machines also showed a decrease in relative roentgen output. A possible explanation of this phenomenon is the incorporation of more effective inherent filtration in this group.

Whereas added filtration in a machine effected some decrease in relative roentgen output, the operator dose was decreased even more. This may indicate that filtration is effective in reducing

Table 2 • Average relative roentgen output by age of machine

Age of machine (years)	Unfiltered	Filtered	Decrease (%)
0- 5	1.74 r/sec.	1.42 r/sec.	18.4
6-10	1.77 r/sec.	1.55 r/sec.	12.4
11-15	1.83 r/sec.		
16-20	1.60 r/sec.		
over 20	1.35 r/sec.		

Table 3 • Relation of operator-to-patient distance to operator dose

Distance (feet)	Dose	Unfiltered machine	Filtered machine
3 or less	.239 mr/sec.		
4-5		.232 mr/sec.	.095 mr/sec.
6-7		.202 mr/sec.	
more than 7		.116 mr/sec.	.003 mr/sec.

Table 4 • Relationship between brand of x-ray machine and relative roentgen output

Brand	Number of machines	Average age (yrs.)	Average relative r output (r/sec)
XRM	3	5.3	1.35
G. E.	45	13.37	1.39
Fischer	7	16.9	1.43
X-Cel-Ray	8	5.19	1.56
Mattern	4	8	1.61
Weber	17	12	1.74
Misc.	2	13	1.81
Ritter	30	10.13	1.90
Meyer	6	12.8	2.88
	122 (total)	11.6 (av.)	1.67 (av.)

secondary radiation without an appreciable loss of direct radiation energy.

The average dentist covered in this survey is statistically "safe." However, individual dentists may not be operating within the limits of safety as recommended by the National Bureau of Standards.[7] Many dentists are receiving more than the maximum permissible dose per second[10] and are safe only because of limited utilization of x-ray equipment.

Certain measures which are mandatory if the dentist is to remain within permissible exposure limits are: (1) establishment of correct collimation and filtration in each x-ray machine; (2) utilization of high-speed film to reduce exposure further; (3) use of a timer cord of a minimum length of eight feet.

SUMMARY

This article is a preliminary report of a survey of the status of radiation exposure of dentists in 113 dental offices with 122 x-ray machines. As a result of a random sampling of 600 Chicago area dental offices via a radiation survey questionnaire, 42 per cent of the dentists responded, requesting the survey service.

Four teams of senior dental students at the College of Dentistry, University of Illinois, conducted these office surveys. Relative roentgen output of the machine, and dose to the operator were measured.

In terms of his own safety, the "statistical dentist" in this survey is operating his x-ray equipment under safe conditions. However, evaluation of the data indicates that certain individual dentists can establish a more acceptable level of personal safety by collimation and filtration of the x-ray machine, employment of more sensitive film and increasing the timer cord length.

The element of patient safety was not investigated in this study.

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Symphony of Science • A great scientific contribution is like a beautiful mosaic made up of many stones, or like a marvelous symphony to which many musicians contribute their share but no one of which constitutes the mosaic or the symphony itself. *Selman A. Waksman*

Radiation protection for dental patients

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Radiation received by the dental patient in roentgenographic procedures can be minimized by the following means: limiting the roentgen-ray beam, or shielding parts of the patient's body; applying metal filters to the x-ray tube; using higher kilovoltage; using higher-speed dental films, and decreasing the frequency and extent of roentgenographic examinations.

It is now expected that dental practitioners will have some understanding of radiation hazards and precautions as a result of publicity given to a recent report by the National Academy of Sciences, "The Biological Effects of Atomic Radiation."[1] This report held that fallout from nuclear bomb testing presented no serious radiation danger at present, but warned about dangers to the population as a whole due to the wide use of medical and dental roentgen rays, with special reference to undesirable genetic effects as a late sequel of the radiation involved. The medical and dental professions have the responsibility, first, to find out the facts concerning the amount of radiation received in diagnostic studies, and then to seek ways to limit radiation without losing the benefit of roentgenographic diagnosis.[2]

Such studies have been reported by radiologists.[3-6] Dentists need precise information and some background understanding in order to do indicated roentgenographic work with safety to their patients, and to answer the questions of those who, because of inadequate information, may be unduly alarmed about dental use of roentgen rays.

In this paper we shall not discuss radiation protection of the dentist or the dental assistant, although this matter is important.

The possible dangers of radiation to the patient can be classified as those due to the primary roentgen-ray beam and those due to scattering; that is, secondary roentgen rays which reach more distant parts of the body after rebounding from the target area of the patient, or from the walls or floor of the x-ray room, and so forth. Too much radiation in the primary beam might conceivably produce erythema of the face. Another danger has been emphasized recently that even relatively small doses of radiation to the sex glands can cause damage to the germ plasm, and could result in genetic harm to succeeding generations.

Although the amount of radiation required to produce acute erythema has been established (165 r for threshold erythema dose at 65 kilovolts peak according to Richards[7]), the other types of damage are less clearly defined and harder to recognize. It has long been

known that radiation in large doses can produce anemia. But recent reports[8] suggest that leukemia is a disease which may be causally related to radiation. Muller's[9] classical research work on x-ray mutations in *Drosophila*, or fruit-fly larva, stands as a warning that radiation can produce congenital deformities in the descendants of those exposed. To the argument that human beings are not fruit flies is opposed the sobering fact that Russell[10] showed that radiation produces in the mouse, a mammal, a mutation rate higher than that found in *Drosophila*. The geneticists have stated that no amount of radiation received by the gonads, however small, is without effect, so that we should not be satisfied with finding that scattered radiation to the gonads is low in amount, but always try to make it lower. A rough guide to the amount of permissible radiation is furnished by the United Nations scientific committee on effects of atomic radiation, which advised that for the population as a whole the average dose of radiation to the gonads be limited to that received from all natural sources—about 10 r up to the age of 30 years. In the United States radiation due to medical and dental roentgenography is believed already to have reached this level.[2]

METHODS FOR LIMITING RADIATION TO THE PATIENT

Various methods have been proposed for limiting radiation received by the patient in roentgenographic procedures. Among these are (1) limiting the roentgen-ray beam, or shielding parts of the patient's body, (2) applying metal filters to the x-ray tube, (3) using higher kilovoltage, (4) using higher-speed dental films, and (5) decreasing the frequency and extensiveness of roentgenographic examinations.

Diameter of Roentgen-ray Beam • A basic principle in roentgenography is the use of the smallest limiting cone possible in order to reduce the size of the roentgen-ray beam to the smallest useful size. This minimizes both the direct and the scattered radiation, and as a result the roentgenogram shows more detail. The value of this procedure on genetic grounds recently has been emphasized by one of us (I.E.K.).[11] Richards[7] advocated reducing the diameter of the primary beam to 2½ inches by placing a lead diaphragm in the tip of the dental x-ray cone. The present authors used a diaphragm made by cutting a hole 1⅛ inches in diameter in the center of a lead disk and placing it in the base of the cone next to the x-ray tube. Measurements were made of the radiation reaching the patient with and without this diaphragm. These will be given later in this paper.

Filtration • Adding filtration to the x-ray tube has been advocated by Trout, Kelley and Cathey,[12] who showed an 80 per cent reduction in the radiation when a filter composed of 2 mm. of aluminum was used (at 50 kilovolts peak). Kirsh[4] showed that aluminum filtration (2 mm. in roentgenography and 3 mm. in fluoroscopy) caused a steep drop in radiation dosage (63 per cent to 77 per cent decline) in examination of different parts of the body. The State of New York Public Health Council recommends in its sanitary code the use of 2 mm. aluminum filter in all diagnostic x-ray machines, according to Seemann and Cleare.[13] These writers found a 50 per cent to 57 per cent reduction in skin dose with the use of 1 and 1.5 mm. of aluminum filter.

In the dental service at Hines Veterans Administration Hospital, experiments were made with the addition to the x-ray tube of a 2 mm. aluminum filter, as well as a restricted lead diaphragm with central opening 1 1/16 inches in diameter, both separately and together. The amount of radiation was measured with two newly calibrated Victoreen roentgen meters, one having a scale reading to 25

r, the other to 250 mr (milliroentgens).

Information was obtained about direct radiation in the center of the x-ray beam, and also scattered radiation to more distant parts of the patient's body by placing the roentgen meter not only in the mouth and on the face, but also on the skin over the upper end of the sternum.

With the use of a dental x-ray machine, Weber Model No. 3, operated at 65 kilovolts peak, 10 milliamperes, Serial No. 7M5372, when the Victoreen roentgen meter was placed on a table at the usual 8 inch anode-film distance, the dosage shown in Table 1 was obtained.

Later, measurements were made with the ionization chamber inside the mouth in a constant position, while full-mouth roentgenograms were made. Table 2 shows the results obtained.

Readings were also obtained on the skin of the face while full-mouth roentgenograms were made. In each patient the ionization chamber was held in a fixed position while the different exposures were made, but readings were made of different parts of the face on different patients. Table 3 shows the resulting radiation measurements.

Scattered radiation to the patient is important because of the general effects of radiation on the tissues, especially the blood-forming organs, and also on the gonads (genetic effects). We measured the radiation (principally the primary beam) received by a more distant tissue. An ionization chamber was held on the skin at the level of the upper end of the sternum, when full-mouth roentgenograms were made of different patients. The measurements obtained are shown in Table 4.

Yale and Goodman[11] found that copper filtration caused more reduction in radiation than the usual aluminum filtration. The present authors also found a further reduction of dose on the skin when copper alone and in combination with aluminum was used.

Addition of filtration has been found in medical roentgenographic work to improve the diagnostic quality of films by decreasing the "contrast." The same beneficial effects of filtration can be observed in dental films.[11]

Frequently asked questions are (1) how much the exposure time has to be increased when filters are used and (2) whether the increased exposure time cancels out the saving in radiation produced by filters. It was found by comparing roentgenograms that if no other change were made except adding 2 mm. aluminum filter, it would be necessary to increase the exposure time from 1¼ sec-

Table 1 • Radiation in center of field, on surface, at 60 kvp, anode-film distance 8 inches

Filter	Measured radiation (in air)*	
	r per minute	r per second
None	200	3.3
2 mm. Al	54	0.9
0.125 mm. Cu	26	0.43
0.125 Cu + 0.5 mm. Al	24	0.40

*In these measurements, back-scatter from the table is present.

Table 2 • Radiation inside mouth, with standard kilovoltage and distance, roentgen meter in position through full-mouth series. Each reading was made with a full-mouth series of roentgenograms on a different patient

Filter	Radiation (r)
None	2.4
	4.5
	2.4
	3.1 Av.
2 mm. Al	2.0
	1.4
	1.5
	1.6 Av.
2 mm. Al + lead diaph.	0.7
	0.8
	1.2
	0.9 Av.

Table 3 • Approximate radiation of skin of face. Each reading made with a full-mouth series of roentgenograms on a different patient

Filter	Position of roentgen meter on face	Dose (r per second)
None	Middle of cheek—upper	7.0
	Middle of cheek—occlusal line	8.6
	Middle of cheek—lower	5.6
2 mm. Al	Posterior molar—occlusal line	2.0
	Middle of cheek—occlusal line	1.9
	Central incisor—occlusal line	2.6
2 mm. Al + lead diaph.	Upper posterior molar	1.4
	Middle of cheek—occlusal line	0.9
	Lower central incisor	1.0

onds to 1½ seconds (20 per cent more time) to obtain the same quality of roentgenogram. However, the exposure time can be kept the same if the developing time is merely increased by 20 per cent (for example, from 2½ minutes to 3 minutes). When 0.125 mm. copper filtration is used, doubling the developing time produces films of the same quality. By making this correction in the darkroom, the saving in radiation can be retained.

Kilovoltage • Etter[15] showed that skin doses could be reduced in dental roentgenography by increasing the kilovoltage from the usual 60 to 65 kilovolts peak level to approximately 100 kilovolts peak. The fact that this change would necessitate the purchase of a new x-ray machine by the practitioner limits the usefulness of this proposal.

Speed of Film • The use of dental films of highest speed has obvious merit, provided the diagnostic quality is preserved. With ordinary dental film a total exposure of 40½ seconds is required for a 14-film, full-mouth series. With Eastman Ultra-Speed or Radia-Tized film, 20¼ seconds are required. With Minimax extra-fast films, 13¼ seconds are required. We use dental films of the highest possible speed, and consider the quality of the films quite satisfactory for diagnosis.

Frequency and Number of Roentgenographic Examinations • The last proposed measure for limiting radiation in dental roentgenographic procedure is one which involves the clinical judgment of the dentist. It is recommended that he consider limiting the frequency of roentgenographic examinations and restricting the number of x-ray exposures per examination; that he see if one film or few would suffice instead of a full-mouth series in a given instance, and that he reconsider the indications for any dental roentgenograms which may have been taken routinely on a time schedule in the past, and obtain them only when clearly needed.

CONCLUSIONS

1. The value of roentgenography in dental diagnosis is well established. That there is a theoretical risk to the patient from the incidental radiation must be reckoned with. A detailed study of the quantity of radiation involved is presented.

2. The amount of radiation reaching a single area of the skin of the patient's face in a full-mouth roentgenographic series varies from 5.6 to 8.6 r. This amount of radiation presents no significant danger of skin damage, even if repeated every year. Budowsky's[16] figures of

55 r to 75 r to different skin areas, and Nolan and Patterson's[17] of over 75 r to individual areas of the skin, were not even approached in our studies. The reason for this difference is at least partly due to the use of slow film in the older studies, and a larger number of exposures in Nolan and Patterson's.

3. By the use of a simple aluminum or copper filter, or both, the amount of radiation reaching a single area of the patient's face in the full-mouth roentgenographic series can be reduced to 1.9 to 2.6 r, without impairing the diagnostic quality of the films.

4. The further addition of a lead diaphragm with reduced aperture to the x-ray tube can reduce the dose to 0.9 to 1.4 r per full-mouth series, by making the roentgen-ray beam narrower.

5. Measurements of radiation made over the sternum show the approximate dosage received by a blood-forming tissue (when allowance is made for absorption in the overlying structures). This was 80 to 135 mr (0.080 to 0.135 r) for a single full-mouth series of roentgenograms. No known harmful effects can be expected of this small dose. However, because of warnings in the literature of possible leukemogenic effects of radiation, it would be a useful precaution to use filters and lead diaphragm, which have decreased the dose over the sternum to as little as 10 milliroentgens.

6. Concerning gonadal doses, it must be remembered that we are thinking of increased mutations with resulting congenital abnormalities in succeeding generations, and we are told that gonadal radiation is cumulative (until the possibility of conception has passed). Medical roentgenography is the most important consideration here. Studies of gonadal scattered radiation during dental roentgenography should be made, in order to find ways of reducing this to the lowest possible level.

7. The value of using high-speed dental films is stressed.

Table 4 • Radiation of upper end of sternum. Each reading made with a full-mouth series of roentgenograms of a different patient

Filter	Measurement (r)
None	0.135 0.114 0.080 0.109 Av.
2 mm. Al	0.044 0.080 0.062 0.061 Av.
2 mm. Al + lead diaph.	0.028 0.018 0.025 0.023 Av.
0.125 mm. Cu	0.040 0.045 0.028 0.037 Av.
0.125 mm. Cu + lead diaph.	0.013 0.011 0.010 0.011 Av.
0.125 mm. Cu +0.5 mm. Al	0.028 0.020 0.020 0.023 Av.
0.125 mm. Cu +0.5 mm. Al + lead diaph.	0.016 0.010 0.011 0.012 Av.

8. The clinical judgment of the practitioner may disclose ways of limiting the number and extensiveness of dental roentgenographic examinations, while retaining this valuable method of diagnosis in necessary studies.

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The effect of periodontal treatment on the connective tissue fibers of the marginal gingiva: II

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Tests with disclosing solution and repeated biopsies of the marginal gingiva after periodontal treatment show the positive effects of therapeutic measures. Home care included the daily use of soft bristle toothbrushes, unwaxed dental floss and a water spray.

This is a report on the subsequent changes in the connective tissue fibers of the marginal gingiva and in the periodontium of a patient first treated in May, 1952.

At that time, treatment consisted of three biopsies; systematic, repeated curettage of all involved root surfaces until they were clean and smooth; and special instruction in technics of personal oral hygiene. The effectiveness of treatment and hygienic procedures was tested with applications of disclosing solution in the dental office as well as by the patient at home. The clinical observations were evaluated microscopically, using serial sections of the biopsy specimens. Results after one year were reported in a previous issue of THE JOURNAL.[1]

The patient received no professional treatment from 1953 until January 1958, except a prophylaxis by a dentist in August 1957. During the 1953 to 1958

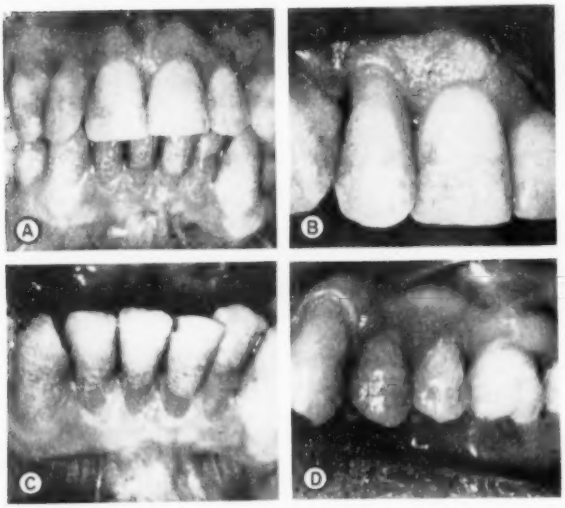

Fig. 1 • (A) Upper and lower incisors in occlusion. (B) Site of current and previous biopsies, upper right lateral incisor region. (C) Lower incisors. (D) Upper left bicuspid region, site of 1953 biopsy

interval, he was supplied with soft bristle toothbrushes, unwaxed dental floss and water sprays. The water spray for pocket irrigations was added to the armamentarium for personal oral hygiene in 1954.

RESULTS OF CURRENT EXAMINATION

The patient returned for examination in January of 1958. A complete mouth examination, roentgenograms, models, photographs and another biopsy of the upper right lateral region were made.

Results of the mouth examination are shown in Figure 1. All of the teeth were firm and no excessive mobility could be detected by digital examination. No soft, thick microbial masses were seen adhering to tooth surfaces. A few small nodules of calculus were found. The teeth were stained gray to brown by a thin, transparent pellicle. No pus was found nor could any be squeezed from periodontal pockets except in the lower left first and second molar region. There was no bleeding and gentle probing of the sulci caused none. The pockets ranged in depth from 1 to 3 mm., except one on the distal aspect of the lower left first molar which was still approximately 11 mm. deep. There was no sign of the fistula, previously reported, in the lower incisor region.

The gingival tissue was pink, firm, stippled and not swollen. Comparison with the photographs made in 1952 revealed some additional recession. The exposed root surfaces were hard, shiny and light brown in color. There was no sensitivity to cold water, air or other stimuli.

The piece of gingival tissue removed by biopsy is shown in Figure 2.A. The outer and inner surfaces were hard and glossy. No ulceration or granulation was present and no calculus, pus or microbial masses were found on the root surface beneath the gingiva.

Serial sections cut in a horizontal plane through the entire specimen revealed little cellular exudate (Fig. 2,B, C). Those sections nearest the bottom of the

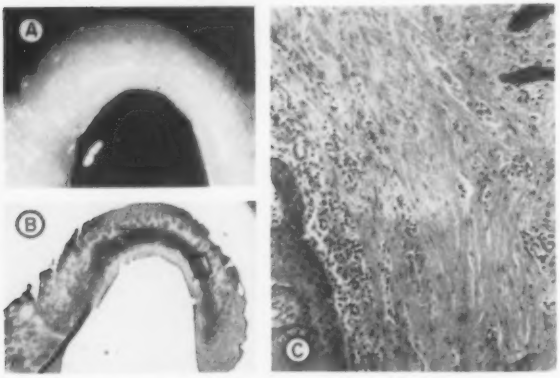

Fig. 2 • (A) Gingival tissue removed from labial surface of upper right lateral incisor. (B) Low power photomicrograph of section near crest of gingiva, showing dense circular fibers. (C) High power photomicrograph of region in black square of view B.

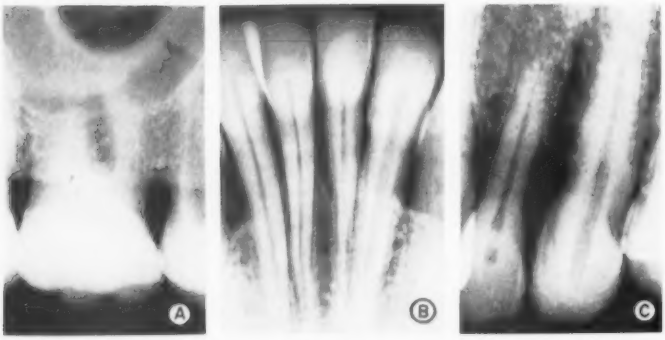

Fig. 3 • (A) Upper left bicuspid, molar region. (B) Lower incisors. (C) Upper right lateral incisors.

gingival sulcus contained the greatest amount of exudate. The exudate was always on the side next to the root surface. The epithelium was intact throughout, except for a few artifacts created during sectioning. The connective tissues were dense, and as the sections were cut in a horizontal plane, the circular band of fibers was seen filling almost all the space between the labial and inner epithelium. High magnification revealed lysis of some fibers near the root surface. Polymorphonuclear leukocytes were seen in this zone and in the sulcus epithelium. The overall microscopic picture indicated a state of gingival health superior to that seen in the original biopsies.

The roentgenograms (Fig. 3) revealed no positive evidence of bone building or bone loss. The crests of the alveoli were relatively dense. Fragments of calculus were represented by radiopacities on root surfaces. The bone pattern indicated deep pockets, especially on the distal side of

the lower left first molar, but the roentgenographic image was equally as good, if not better, than when the patient was first examined 4½ years ago.

DISCUSSION AND SUMMARY

Tests with disclosing solution, and repeated biopsies of the marginal gingiva after periodontal treatment, gave positive evidence of the effect of therapeutic measures. In this instance, four pieces of tissue were removed over a 4½ year period. The first revealed marginal gingiva in which the connective tissues were almost completely destroyed. With each succeeding sampling, more and more connective tissue with less and less cellular exudate was found. Also, as the tissues regenerated, the clinical signs of periodontal disease disappeared.

This desirable result was achieved by close collaboration between the dentist and his patient. The dentist removed calcareous deposits from the teeth and polished all root surfaces as smooth as possible. He also taught the patient the chief cause of periodontal disease; namely, the microorganisms which adhere to the tooth surface at the gingival crest and in the periodontal pocket. Basic fuchsin was used to test the teeth for adherent microorganisms, by the dentist in his office and by the patient at home. The home test provided the patient with a simple, practical, positive guide which enabled him to perfect his cleansing technics.

The items used daily to obtain thorough removal of microbial masses, were soft bristle toothbrushes, unwaxed dental floss and water spray.[2] The resulting healthy condition achieved during the first few months of treatment and the continuing improvement during following years, as seen clinically and microscopically, are the strongest kind of supportive evidence regarding the effectiveness of the therapeutic measures employed by the dentist and the patient.

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Frontiers and New Vistas • The frontiers and new vistas urgently awaiting attention are not found in physical and chemical research or in engineering but in man himself; not in technologies but in the wisdoms that give meaning and direction to them. Science has released to mankind tremendous energies and opportunities, but man must turn inward for understanding and direction of these things. As scientists our opportunity is to see the interdependence of our individual specialties and the order of the Universe, of our individual selves and all mankind. We must understand more about healthy self-interest and our interdependence for we have neglected their importance to the lopsided cultivation of profits, power, prestige and "success," which are pseudovalues, mirages and means rather than ends. We are part of humanity, units of living and loving and reasoning that are genuine communities whose members are part of each other—not standardized parts but in common eagerness for the same values.—*J. A. Aita and G. A. Young. Love, Affection and Human Relatedness. The Nebraska State Medical Journal, September 1958*

The oral yeast-lactobacillus relationship
I. Nonutilization of hexosephosphates by an oral lactobacillus

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The theory that there is a symbiotic relationship between an oral yeast and an oral lactobacillus as the result of a complementary effect of the enzyme systems of each is based on the premise that the high phosphatase activity of the yeast provides the lactobacillus component of the mixed culture with hexosephosphates. A study was carried out on the utilization by an oral lactobacillus of the hexosephosphates for growth and acid production. The study demonstrated that an intact, viable, metabolizing oral strain of Lactobacillus casei *cannot utilize hexophosphates for growth or lactic acid production.*

Early comparative studies employing dried cells of an oral yeast and an oral lactobacillus demonstrated that glucose was rapidly phosphorylated by the enzymes of the yeast preparation.[1] This was in contrast to the relative inability of the lactobacillus preparation to initiate these reactions.[2] However, the reduction of pyruvic acid was found to be readily accomplished by the lactobacillus, whereas the yeast was without such an effect; the intermediate steps of glycolysis were shown to be catalyzed with equal facility by the two microorganisms.[2] This information, along with the coincidental observation that these two microorganisms would decalcify more tooth enamel in mixed culture than the additive effect of each in pure culture,[3] served as the basis for the theory that this apparent symbiotic relationship between the two was the result of a complementary effect of the enzyme systems of each.[4] That the high phosphatase activity of the yeast provides the lactobacillus component of the mixed culture (either directly or indirectly) with hexosephosphates, is the initial premise of this theory. It is contingent on the speculation that the phosphorylating enzyme systems of the yeast, or its products, are available to, or are utilizable by, the lactobacillus.

A number of vague references can be found in the literature, alluding to the failure of certain phosphorylated derivatives of glucose to support bacterial growth.[5-7] Also, and more specifically, *Escherichia coli* has been shown to oxidize certain hexose monophosphates, but not to grow at all on the diphosphate of fructose.[8,9] Apparently, however, no information is available concerning the

efficiency of the hexosephosphates as an energy source for lactobacilli. As the first step in the re-examination of the oral yeast-lactobacillus relationship, and as one test of the original hypothesis that the microorganisms concerned jointly degradate glucose, a study of the utilization of the hexosephosphates for growth and acid production by an oral lactobacilli has been carried out and is the subject of this article.

EXPERIMENTAL METHODS

Medium • A casamino acid medium[10] was employed for the growth studies and the cultivation of the lactobacillus cells used for the lactic acid production tests. The only modification of this medium was the required variation in the nature and concentration of carbohydrate employed, and the provisional addition of a yeast culture filtrate as required by a particular experiment.

Microorganisms • An oral strain of *Lactobacillus casei*, strain L652, originally obtained from the Zoller Dental Clinic, University of Chicago, was used throughout these studies. Stock cultures were maintained on tomato juice, yeast extract medium slants stored at 4°C.

The inoculum of lactobacilli used for the growth tests was prepared from a 24 hour culture of the test microorganism incubated at 37°C. in a broth medium of the same composition as that used for the growth studies. This culture was washed two times in a sterile buffer, pH 6.8, and added to each tube at a dilution to give 0.001 ml. of the original culture. Final volume was 5 ml.

A yeast culture filtrate was obtained by growing a strain of *Candida albicans*, isolated from human saliva, for 24 hours in the same medium used for the bacterial growth studies. The yeast cultures were filtered through a sintered glass filter and the sterile filtrate was added to the appropriate lactobacillus cultures.

Although the original observations[3] of the oral yeast-lactobacillus relationship were made with other species of oral yeast and lactobacillus *(Saccharomyces cerevisiae* and *Lactobacillus acidophilus)*, the two microorganisms used in this study *(C. albicans* and *L. casei)* have also demonstrated an apparent symbiotic activity. Cultures of these microorganisms in combination were tested and found to produce a lower pH of the medium after 48 hours' incubation than either microorganism alone. A similar interrelationship also has been observed in a mixed culture of *C. albicans* and *L. acidophilus* by Young, Krasner and Yudkofsky.[11] Notwithstanding the difference in organisms, the combination used in the present study appears to be adequate for a valid examination of this problem of oral ecology.

The hexosephosphates that were compared to glucose as an energy source for *L. casei* were: glucose 1-phosphate, glucose 6-phosphate, fructose 6-phosphate, and fructose 1,6-diphosphate, obtained from the Nutritional Biochemicals Corporation, Cleveland, Ohio.

Lactic Acid Production and Determination • The capacity of this strain of *L. casei* to convert the hexosephosphates to lactic acid was tested in a medium that would not support growth because of lack of a nitrogen source. It was of the following composition, per milliliter: K_2HPO_4, 1.0 mg.; KH_2PO_4, 1.0 mg; $MgSO_4 \cdot 7H_2O$, 0.5 mg.; NaCl, 10 micrograms; $FeSO_4 \cdot 7H_2O$, 10 micrograms; $MnSO_4 \cdot H_2O$, 10 micrograms; p-aminobenzoic acid, 0.5 micrograms; pyridoxal, 0.5 micrograms; riboflavin, 2.5 micrograms; nicotinic acid, 2.5 micrograms; thiamine, 2.5 micrograms; calcium pantothenate, 2.5 micrograms; biotin, 0.05 micrograms; folic acid, 0.05 micrograms; glutathione, 0.05 mg.

This medium was prepared in a fourfold concentration and 1 ml. was placed in each tube. To each tube was added

Table • Nonutilization of phosphorylated hexoses for growth by *Lactobacillus casei*

Hexose tested in medium	0.006 molar each hexose	0.002 molar glucose plus 0.004 molar each hexose	Yeast filtrate plus 0.006 molar each hexose
Glucose	0.20*†	0.195*	0.250
Glucose 1-phosphate	0.00	0.055	0.047
Glucose 6-phosphate	0.00	0.053	0.060
Fructose 6-phosphate	0.00	0.053	0.060
Fructose 1, 6-diphosphate	0.00	0.060	0.050
None	0.00	0.050	0.053

*These tubes contained the same concentration of glucose.
†Growth recorded as optical density units at 525 mμ on Bausch and Lomb Spectronic 20.

1 ml. of a 0.1 molar solution of the test glucose or hexosephosphate, 1 ml. of yeast filtrate (or water) and 1 ml. of a twice-washed suspension of *L. casei*. After these were thoroughly mixed, the tubes were incubated at 37°C. for 20 hours. Endogenous controls and blanks were included in all experiments. After the incubation period, the tubes were centrifuged and the supernatants were tested for the presence of lactic acid by a modification of the Barker and Summerson method,[12] as described by Markus.[13] It was found, however, that with this system the deproteinization, and the cation-removal procedures, as recommended by Markus, could be omitted and removal of sugar carried out directly on the supernatants.

RESULTS AND DISCUSSION

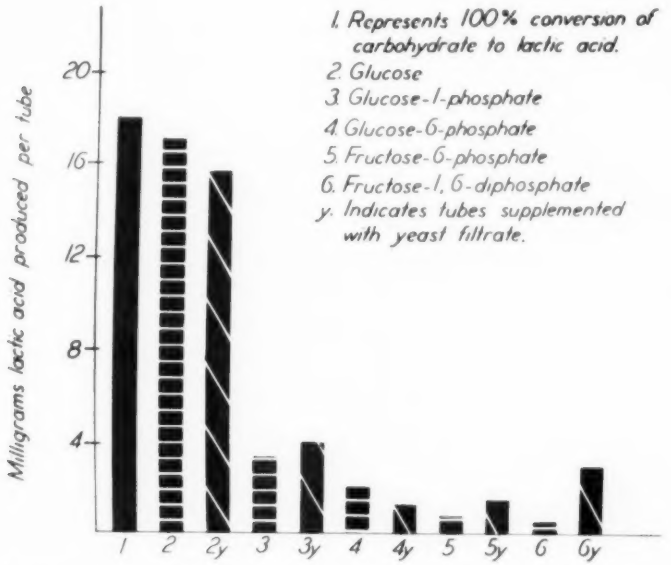
The growth of *L. casei* in the synthetic medium was limited by restricting the concentration of available carbohydrate to about one fifth of that required for maximum growth. This permitted the use of maximum growth as the criterion of glucose or phosphorylated hexose utilization, and maximum growth was reached in 72 hours' incubation. Increasing the incubation time beyond 72 hours did not result in the initiation of growth in those tubes that had previously failed to show growth, nor did it effect any further increase in turbidity of those cultures that had already demonstrated growth.

Preliminary growth tests demonstrated that this lactobacillus would not initiate growth when only the phosphorylated hexoses were supplied as an energy source. However, it seemed possible that utilization might occur if a large number of cells were used as an inoculum, or if the cells were actively metabolizing as a result of previously initiated growth. In order to test this hypothesis, growth was measured in a series of tubes of the broth medium supplemented with 0.002 molar glucose and 0.004 molar of the test hexosephosphates. A control series of glucose and one each of the phosphorylated hexoses at a concentration of 0.006 molar were also inoculated. Since it was considered possible that the yeast might produce enzymes or products which would in some manner enhance the availability or utilization of the hexosephosphates, 0.5 ml. of the yeast filtrate was added to another series of tubes containing either glucose or each hexosephosphate. The table shows that when a minimal amount of glucose was added to the hexosephosphate-supplemented medium to "spark" the growth of *L. casei*, the only growth

observed was proportional to the glucose available. Similarly, the small amount of growth observed in those tubes which were supplemented with yeast filtrate can be attributed solely to the residual carbohydrate in the filtrate. These findings were confirmed by other experiments employing a yeast filtrate prepared by growing the *C. albicans* in the same medium but with succinate substituted for glucose as an energy source for the yeast (the lactobacillus cannot utilize succinate in place of glucose). This filtrate did not provide sufficient carbohydrate to allow the initiation of growth by the *L. casei* and, like the filtrate shown in the table, it did not alter the utilization of the phosphorylated hexose.

Whereas the results of the growth studies clearly demonstrated that the hexosephosphates were not utilizable for growth by the lactobacillus, a corroborative experiment measuring the conversion of carbohydrate to lactic acid by a heavy, nongrowing suspension (dry weight, 1 mg. per milliliter) of the *L. casei* was undertaken. Preliminary experiments demonstrated that the thoroughly washed cells in an incubation medium of buffer and salts did an inefficient job of converting glucose to lactic acid. However, the addition of glutathione and the complete vitamin mixture, as found in the growth medium, allowed relatively efficient conversion to proceed. The results of the lactic acid production tests are shown in the illustration.

The conversion of glucose to lactic acid was within the expected range, and confirmed the growth experiments that indicated relatively efficient utilization. Also, the figure shows that yeast filtrate failed to exert a noticeable influence on the capacity of the enzyme systems of the "intact" lactobacillus to convert glucose to lactic acid. However, although small



Representation of capacity of a nongrowing suspension of an oral lactobacillus to convert glucose and hexosephosphates to lactic acid in the presence and in the absence of a yeast filtrate.

amounts of lactic acid were formed in those cultures which contained the hexosephosphates, the presence of a yeast filtrate in the system was without apparent effect.

Although these results would seem to indicate that there was at least a partial utilization of the hexosephosphates, there are a number of extenuating factors that should be considered. First, it is possible that if the failure of the phosphorylated hexoses to support growth was a result of the inability of these compounds to cross cell membranes in amounts sufficient to provide the necessary energy, these results may be due to the conversion by a great number of cells of an extremely small amount of phosphorylated hexose that crossed the intact cell membrane of each cell. Also, it is possible that when one prepares and uses a large number of such cells, a certain number will have altered or disrupted membranes that are no longer selectively permeable or rely upon an active transport system for the admission of materials to the interior of the cell. It would then follow that once the appropriate enzymes of the altered cells came into contact with the phosphorylated intermediates of the glycolytic scheme, the formation of lactic acid would result. In addition, one might suspect that a small amount of unphosphorylated sugar was released by the breakdown of the hexosephosphate under the conditions of incubation.

Another factor that might be considered as an explanation for the formation of the small amounts of lactic acid in those systems containing the hexosephosphates, is the presence of subthreshold amounts of glucose or fructose as contaminants in the commercial preparations of the phosphorylated sugars. To examine for this possibility, the hexosephosphates used in the study were chromatographed by the method of Bandurski and Axelrod.[14] Spots which could be attributed to the homologous phosphorylated hexose and to the inorganic phosphate, were demonstrated by the Hanes-Isherwood reagent.[15] Coincident strips stained with ammoniacal silver nitrate reagent revealed faint spots with the same Rf as glucose controls. However, these spots represented but trace amounts of glucose, less than 0.1 per cent of the total carbohydrate applied to the paper, so this contaminating source would not have been of sufficient magnitude to account for the small amounts of lactic acid formed in the presence of the phosphorylated hexoses.

SUMMARY

These studies demonstrate that an intact, viable, actively metabolizing oral strain of *L. casei* cannot, or at best can only very slowly and inefficiently, utilize glucose 1-phosphate, glucose 6-phosphate, fructose 6-phosphate and fructose 1,6-diphosphate, for growth or lactic acid production. The results are also relatively unaltered by either the presence or absence of an oral *C. albicans* filtrate. The apparent synergistic activity of the yeast and the lactobacillus cannot be interpreted on the basis of a complementary effect of certain glycolytic enzymes from each microorganism (as suggested by the earlier workers) inasmuch as the first and major premise of this theory was a speculation that the lactobacillus can readily utilize the hexosephosphates in the place of glucose as an energy source.

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Porosity in the full cast crown

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Use of the hygroscopic technic can lead to "back pressure" porosity in cast crowns. Twenty-three casting variables were studied as possible factors in causing this porosity. "Back pressure" porosity usually can be eliminated by using the maximum number of winds of the centrifugal casting machines and by using a minimum of 20 lbs. pressure with the air pressure machine. It is desirable to keep the pattern ¼ inch from the end of the investment mold.

A particular type of porosity in three quarter and full cast crowns was observed in the teaching clinic at the School of Dentistry, University of North Carolina, in the Spring of 1954. Phillips[1] described a "back pressure" porosity, which is similar to that reported in this study. He used an MOD type casting, and related the appearance of the porosity to the position of the casting in the ring, the casting pressure, the duration of casting pressure, and the type of casting machine. Brumfield,[2] in describing this type of porosity, explained that it was probably caused by a lack of rapid venting for the hot gases in the mold cavity. He reasoned that some of these hot gases are forced into the inner core of investment from the vertical sides and the occlusal aspect (Fig. 1). Turbulence and compression of these gases ensue in the investment core, because the gases cannot find rapid escape. If the compressed gas exerts a "back pressure" that exceeds the casting pressure, then the trapped gas will force its way into the molten metal, thus causing porosity.

Brumfield recommended the use of a vent hole directed down into the center

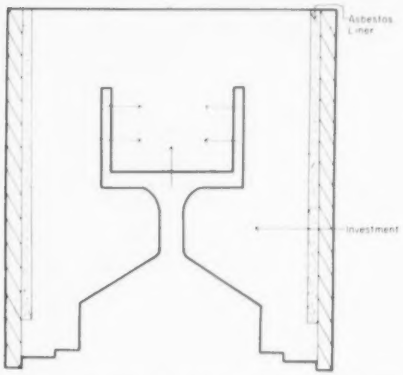

Fig. 1 • Some of the hot mold gases are forced into inner core of investment (as indicated by arrows) when molten metal fills mold. Conflict and compression of these gases ensue.

of the investment core, and advocated the technic of inserting a wax rod into the core when investing the wax pattern (Fig. 2).

It seemed desirable to ascertain if the porosity in question could be eliminated by procedures simpler than those recommended by Brumfield.

PROCEDURE

The National Bureau of Standards full crown type steel die, with its brass jacket and caps, was used to form uniform full crown type wax patterns (Fig. 3).

Three hundred and twenty-eight castings were made to study the effects, if any, of the following variables on the porosity in question: (1) casting pressure, (2) distance of pattern from end of mold, (3) sprue length, (4) sprue direction, (5) sprue gauge, (6) design of the wax at the site of sprue attachment, (7) investment, (8) furnace temperature, (9) furnace time, (10) wax elimination by centrifugal pressure, (11) evacuation of wax by the Hollenback wax evacuator, (12) composition of casting alloy, (13) reservoir, (14) temperature of casting alloy, (15) design of crucible former (sprue base), (16) weight of casting alloy, (17) nonelectric centrifugal machine, (18) air pressure casting, (19) venting mold by Brumfield's method, (20) venting mold directly by 18 gauge channels, (21) venting mold by 14 gauge blind channels, (22) vacuum casting, and (23) spacing the back end of the ring away from the back plate of the casting machine.

Except where noted otherwise, the machines and materials used and the controlled and constant conditions for the castings were as follows: (1) Thermotrol Junior casting machine, (2) R & R Hygroscopic investment, (3) 15 ml. per 50 Gm. water-powder ratio, (4) 15 seconds spatulation time on Hollenback vacuum mixer (Kerr), (5) water bath of 100°F., (6) burn-out time of one hour at 850°F. (preheated oven), (7) muffle loaded with 7 dwts. of a type B gold alloy at 1,470°F., (8) casting temperature of 1,870°F., (9) time from furnace to casting never exceeding 15 seconds, (10) casting machine stopped after 1½ minutes, (11) sprue gauge of 10 (B & S), (12) sprue length of ¼ inch, (13) distance of pattern from end of investment equal to ¼ inch, (14) sprue directed perpendicular to and centered in "occlusal," (15) medium sized ring (Kerr-Hollenback), (16) asbestos lined ring, (17) Kerr's Regular inlay wax.

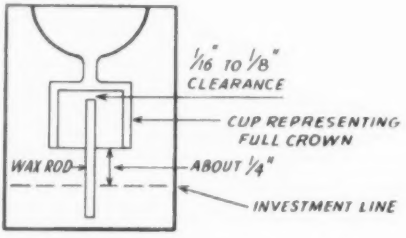

Fig. 2 • Type of special venting in which vent hole is directed down into the center of investment core. A wax rod is inserted into core when wax pattern is being invested. (From Crown and Bridge Construction Using Hydrocolloid Impressions, J. F. Jelenko Co., Inc.)

Three castings were made for each set of conditions.

RESULTS

Casting Pressure • Castings illustrated in Figure 4, a, b and c, were made with 2½, 3, and 4 winds of the casting machine, respectively. When the casting pressure was increased to four winds (Fig. 4, c), the porosity was eliminated. This suggests that the porosity can be eliminated by keeping the casting pressure high enough. Phillips has reported the same.[1] Research to date does not indicate that too much casting pressure can be applied by the centrifugal machines available. This troublesome porosity was completely eliminated from the teaching laboratories at the School of Dentistry of the University of North Carolina by instructing the students to increase the number of winds of the casting machines from three to five.

Pattern Mounting • Increasing the distance of the pattern from the end of the mold from ¼ inch to 7/16 inch increased the likelihood of the porosity, as noted in Figure 4,d, e, f and g, where 4½ winds (4,g) were required to eliminate the porosity.

Increasing the length of the sprue from ¼ inch to 7/16 inch did not affect the character or quantity of the porosity. For the castings illustrated in Figure 4,h, i and j, the sprue length was 7/16 inch, and for those shown in Figure 4,a, b and c, the sprue length was ¼ inch.

Sprueing the crown on the occlusal "angle," with the sprue direction bisecting the angle formed by the side and top of the casting, did not alter the occurrence of this type of porosity except to change its position.

Varying the gauge of the sprue (10, 12, 14, 16 gauge, B & S) had no significant effect with respect to the form of porosity under study. Figures 4,k, l and m illustrate castings made with a 14 gauge sprue. The higher gauge (smaller diameter) sprues cause "shrink-spot" porosity at the site of the sprue attachment, sometimes resulting in a separation of the casting from the sprue, as is illustrated in Figure 4,m. Nevertheless, "back pressure" porosity is absent in this casting.

Fig. 3 • National Bureau of Standards full crown type steel die, with its brass jacket and caps, was used to form uniform wax patterns.

Adding a bulk of wax at the site of the sprue attachment (Fig. 5) did not alter the occurrence of the porosity.

The addition of a reservoir helped to eliminate "back pressure" porosity. Figure 6,a and b illustrates castings made with a 7/16 inch long, 10 gauge sprue, to which was added a reservoir, twice the sprue diameter, as close to the pattern as possible. Only three winds of the casting machine were required to eliminate the porosity, when four winds had been required to eliminate the porosity in castings made without the reservoir (Fig. 4,j).

When a reservoir was added to a 7/16 inch long, 14 gauge sprue (Fig. 6,c and d), the porosity under study was still eliminated at three winds of the casting machine, although "shrink-spot" porosity was introduced because of the smaller diameter sprue, causing a separation in the sprue metal in one out of every three castings made.

Changing the slope of the sprue base to a steeper one had no significant effect on the porosity in question.

Investment • Changing the investment from R & R Hygroscopic investment to

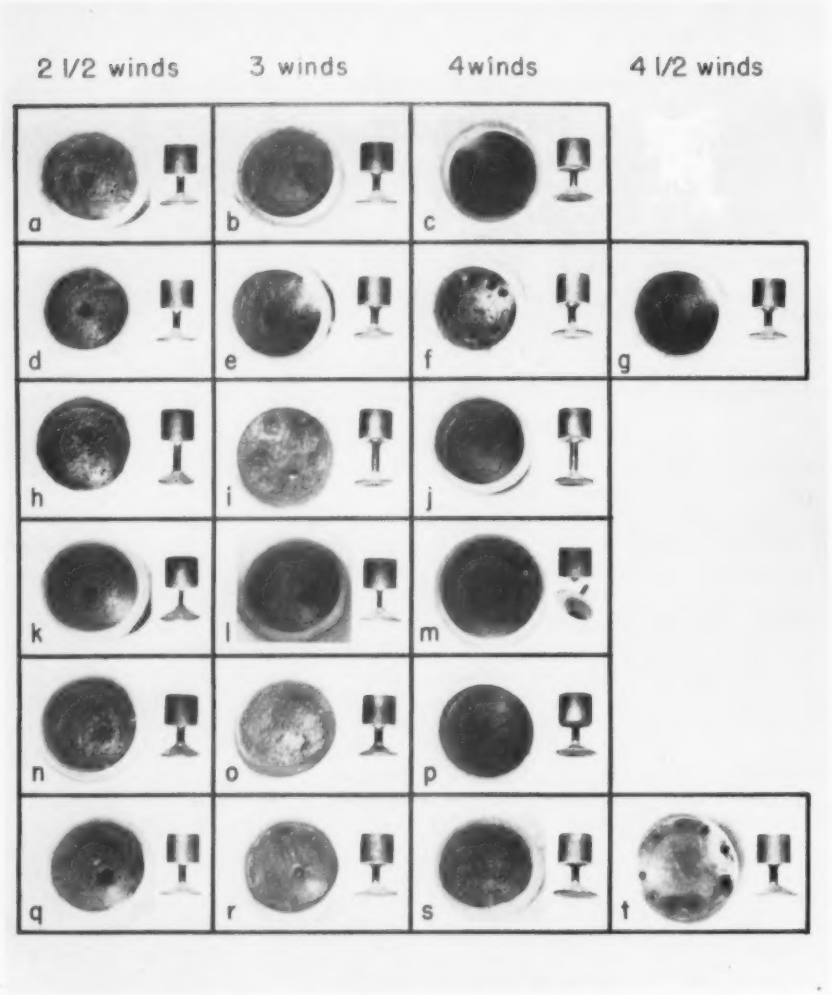

Fig. 4. • To left of each casting is an enlarged view of cavity side of "occlusal" section.

Kerr Cristobalite had a definite effect; namely, that of eliminating the casting porosity under study, even at the low casting pressure of 2½ winds of the casting machine. Probably this can be accounted for by the improved venting of the mold due to a more porous investment resulting from an increased water-powder ratio. (The water-powder ratio for the R & R Hygroscopic investment was 15 ml. per 50 Gm., whereas the water-powder ratio for Kerr Cristobalite investment was 19 ml. per 50 Gm.).

There was no significant difference in the occurrence of casting porosity when Beauty Cast Investment (Whip-Mix

Corporation) was used, as compared with R & R Hygroscopic investment. The water-powder ratio for the Beauty Cast Investment was 15 ml. per 50 Gm.

Wax Elimination • With a burn-out temperature of 1,250°F., no porosity was found, even with the low casting pressure of 2½ winds. Probably this was due to the more complete burn-out of the wax in the pores of the mold wall, thus improving the venting of the mold. A burn-out temperature of 1,000°F. did not change the results appreciably from those obtained with a burn-out temperature of 850°F. Figure 4,n, o and p, shows castings made at a 1,000°F burn-out temperature; these can be compared with Figure 4,a, b, and c, where the furnace temperature was 850°F. Brumfield[3] has stated that some ingredients in wax are never completely eliminated except at temperatures of 1,100°F., or higher.

Increasing the furnace time to two hours, at both 850°F. and 1,000°F., did not affect the porosity significantly.

The results were not affected when wax elimination by centrifugal pressure was employed rather than the standard procedure of burn-out. The procedure used in these tests was as follows: (1) the set, invested pattern was immersed in 190°F. water for five minutes; (2) next, it was placed in the Kerr Centrifugal casting machine (wound three winds) with the sprue hole directed toward the back plate of the machine, and the casting machine released; (3) the pattern was burned out one hour at 850°F.

There was no significant difference in the porosity between castings made in which the wax was eliminated by dry heat and castings made when the Hollenback wax evacuator was employed.

Casting Alloy • When a "white" gold alloy ("Bridge White") was used, there was a significant increase in the porosity. The porosity could not be eliminated in the alloy, even at the highest possible

Fig. 5 • Design of wax at site of sprue attachment showing regular attachment and increased bulk of wax at attachment.

casting pressure (4½ winds). Also, the castings showed more porosity at the various casting pressures (Fig. 4,q, r, s and t). The casting temperature of this alloy was 2,160°F.

Varying the temperature of the casting alloy did not alter the occurrence of "back pressure" porosity. Castings were made (using the standard type B gold alloy) at a pressure of 2½ winds, at each of the following temperatures: 1,760°, 1,800°, 1,850°, 1,900°, 1,950°, 2,000°, 2,050°, 2,100°, 2,150°, 2,200°F. All of these castings exhibited porosity. Two sets of three castings each were made at three winds, in which the casting temperature of the alloy was 1,760°F. for one set and 2,100°F. for the second set. Both of these sets also showed porosity.

When the weight of casting alloy was reduced from 7 to 4 dwt., the casting had little or no sprue metal, and all castings displayed "back pressure" porosity, even at 4½ winds casting pressure (Fig. 6,e, f, g and h).

When 5 dwt. of metal was used, 4½ winds were required to eliminate the porosity (Fig. 6,i, j, k and l). When 7 dwt. of metal was used, only 4 winds were required to eliminate the porosity (Fig. 4,c).

Castings made with 14 dwt. of metal showed the same general pattern of porosity as castings made with 7 dwt. Figure 4,a, b and c can be compared with Figure 6,m, n and o.

These castings seem to support the "rule of thumb" that a sufficient amount

of metal should be used to provide a "button" that weighs about the same as the casting proper.

Casting Machines • A group of castings was made using a Kerr broken-arm centrifugal casting machine which was supplied with a heavy-duty spring. With this machine, the metal was heated with a gas-air blowpipe, and the temperature of the melt prior to releasing the machine was standardized as nearly as possible by judging the color. Three winds of the machine were almost sufficient to eliminate the porosity, and four winds definitely elminated it (Fig. 6,p, q and r).

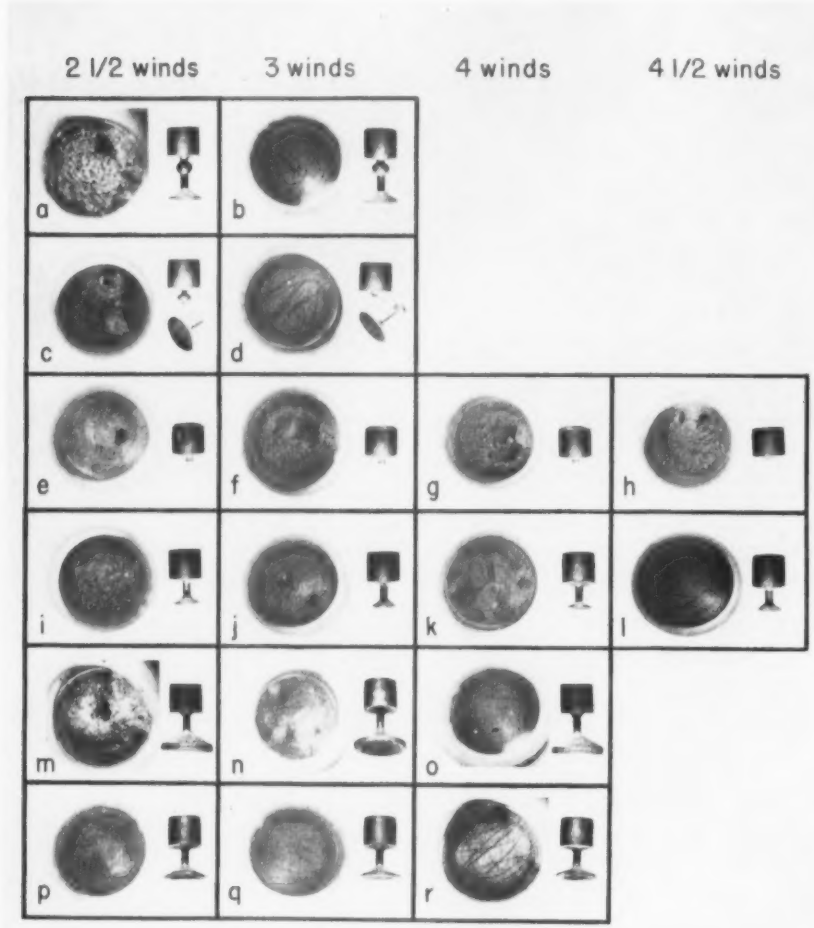

Fig. 6 • To left of each casting is enlarged view of cavity side of "occlusal" section.

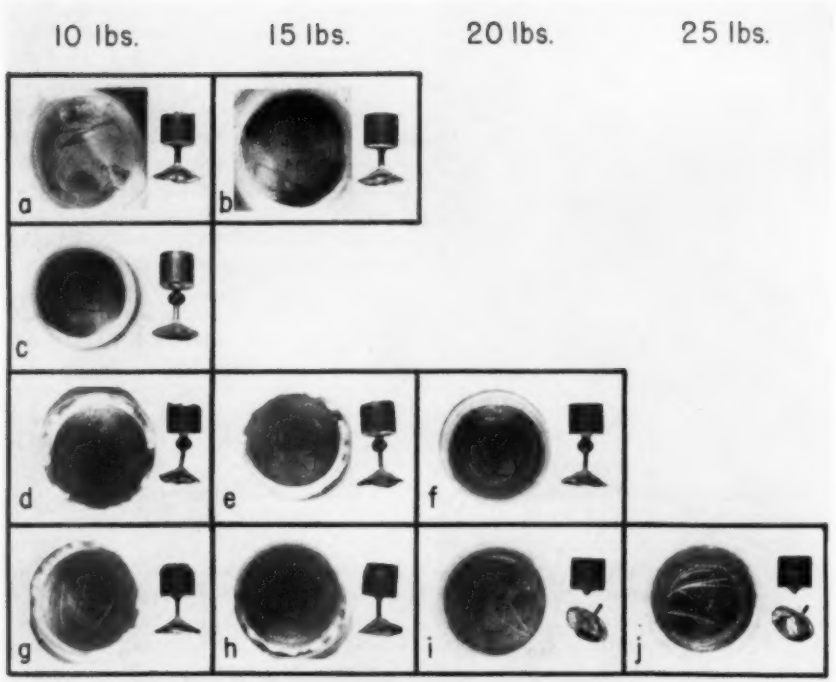

Fig. 7 • To left of each casting is enlarged view of cavity side of "occlusal" section

It is conjectured, in retrospect, that a gradual decrease in tension (through use) of the springs in the casting machines at the North Carolina School of Dentistry is responsible for the appearance and gradual increase of the porosity mentioned in the beginning of this paper.

A number of castings were made with a Harvey air pressure casting machine. A 12 gauge sprue was used, first, without a reservoir. Ten pounds pressure was not sufficient to eliminate porosity (or to make a complete casting to the margins), but 15 pounds pressure eliminated all porosity (Fig. 7,a, and b). When a 7/16 inch, 12 gauge sprue with reservoir was used, ten pounds pressure was sufficient to eliminate all porosity (Fig. 7,c). With a 16 gauge, 7/16 inch sprue, reservoir, and a 10 gauge enlargement of the sprue between the reservoir and the pattern, 20 pounds air pressure was required to eliminate all porosity and make a complete casting to the margins (Fig. 7,d, e and f). With a 4/16 inch, 16 gauge sprue and no reservoir, 25 pounds pressure was necessary to eliminate "back pressure" porosity and give a complete casting (Fig. 7,g, h, i and j). As was expected, "shrink-spot" porosity was present in all castings where the sprue connection to the casting was 16 gauge.

A vacuum attachment, in the form of a rubber hose attached to the back plate of the Kerr Centrifugal casting machine and connected to the Hollenback Vacuum In-

Fig. 8 • All-vacuum casting machine, the Vac-O-Cast

vestor as the source of vacuum, was used to investigate the effect of vacuuming the investment during the first ½ turn of the casting machine. This attachment was judged ineffective in eliminating "back pressure" porosity when castings made at 2½ and 3 winds showed porosity similar to those made without the vacuum attachment.

An all-vacuum casting machine was used with the Hollenback Investor as the source of vacuum (Fig. 8). Castings made at 28½ inches vacuum showed a slight roughness on the cavity side of the "occlusal" section (Fig. 9), but otherwise were complete.

Spacing the back end of the ring away from the back plate of the centrifugal type casting machine has been reported as allowing the gases more freedom in escaping through and out the back end of the investment.[1] A heavy gauge wire gauze (wire frame) was inserted between the back end of the invested ring and the back plate of the Kerr casting machine. Under the conditions of this research, castings made at 2½ and 3 winds had porosity similar to those made under the same conditions minus the spacer.

Mold Venting • Castings made in which a 10 gauge wax rod was directed down into the investment core (Brumfield's method) showed no porosity, even at the low casting pressure of 2½ winds. Positioning and stabilizing the wax rod is difficult and time consuming, however, and would not be expedient in a multiple casting procedure.

Another method of venting the mold was tested in which two 18 gauge wax rods were attached to the pattern 2 mm. from the "gingival" margin and made to extend to the sprue base (Fig. 10, left). This type of venting proved ineffective, inasmuch as castings made at 2½ and 3 winds still exhibited porosity similar to those made when the vents were not used. These results conform to those of Brumfield.

Another method suggested for venting is to attach two round, 14 gauge, wax rods 4 mm. in length to the pattern 2 mm. from the "occlusal" angle (Fig. 10, right). These blind channels had no ef-

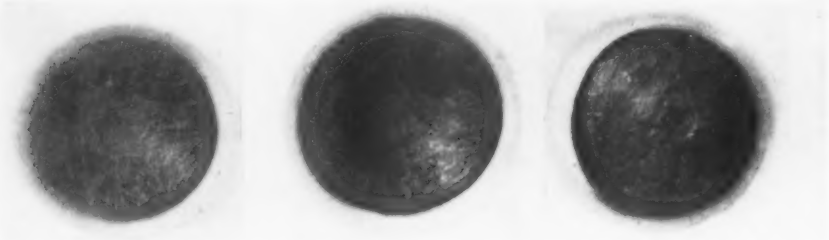

Fig. 9 • Castings made with Vac-O-Cast casting machine showed roughness on cavity side of "occlusal" section

fect on eliminating "back pressure" porosity. As Brumfield has stated, the venting action in such instances is purely local in its effect and not sufficient to vent the gases forced into the center core of the investment.

CONCLUSIONS

1. "Back pressure" porosity (the porosity studied) occurs especially in full crown type castings, because the investment core may not vent hot gases fast enough.

2. Keeping the casting pressure high enough usually will eliminate "back pressure" porosity.

3. Positioning the pattern ¼ inch away from the end of the investment helps to eliminate "back pressure" porosity.

4. Sprue length has no significant effect on the porosity studied.

5. Sprue direction has no effect on the porosity studied.

6. Sprue gauge has no effect on "back pressure" porosity, but the larger gauge sprues (smaller diameter sprues) cause "shrink-spot" porosity.

7. No "back pressure" porosity occurred when a Cristobalite investment was used.

8. Furnace temperatures above 1,100°F. eliminate "back pressure" porosity.

9. Wax elimination methods instituted previous to the furnace treatment of the pattern did not alter the occurrence of porosity.

10. A "white" gold alloy showed more "back pressure" porosity than did a Class B gold alloy.

11. A reservoir helps to eliminate "back pressure" porosity.

12. Varying the temperature of the casting alloy has no effect on "back pressure" porosity.

Fig. 10 • Left: Venting mold directly by 18 gauge channels that were made to extend to sprue base had no effect in eliminating porosity. Right: Venting mold by 14 gauge blind channels attached near "occlusal" angle had no effect in eliminating porosity.

13. If so little alloy is used as to form little or no button, then "back pressure" porosity is more likely to occur.

14. When casting by air pressure, the minimum pressure recommended is 20 lbs. per square inch.

15. A vent hole in the investment core (Brumfield's method) eliminates "back pressure" porosity, but this method is not expedient in a multiple casting investing procedure.

16. Venting the mold by attaching wax rods to the outside surface of the pattern does not reduce "back pressure" porosity.

17. A vacuum attachment for the Kerr casting machine did not reduce "back pressure" porosity under the conditions of this research. Castings made with an all vacuum casting machine seemed acceptable.

18. A spacer placed between the back end of the ring and the back plate of the Kerr centrifugal casting machine did not reduce "back pressure" porosity under conditions in this research.

SUMMARY

The use of the hygroscopic technic can lead to "back pressure" porosity, particularly in a crown type casting, because of a lack of rapid venting of the invest-

ment core. A low water-powder ratio and incomplete burn-out of the wax probably are major factors in causing this porosity. "Back pressure" porosity usually can be eliminated by using the maximum number of winds of the centrifugal machines and a minimum of 20 lbs. pressure with air pressure machines. Keeping the pattern ¼ inch from the end of the investment mold also is desirable.

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Preparation and condensation of amalgam with a low mercury-alloy ratio

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An amalgam mass can be triturated in a mechanical amalgamator so that the amalgam contains a near-optimum ratio of less than 50 per cent mercury. Amalgam triturated in this proportion exhibits desirable clinical aspects in condensation and manipulation. There is little or no excess residual mercury to remove, and the operator need concern himself only with proper condensation of the material. Routine clinical use for four years has confirmed the results of laboratory tests.

One of the variables in the use of silver amalgam has been the uncertain removal of excess mercury from the mass prior to insertion into the cavity and during the condensing procedure. Many technics for this process have been developed, and have been adequate, but all have depended on the skill of the operator. If the operator chose to divide and wring out portions of the amalgam, he was handicapped by the lack of knowledge of how much mercury he was removing, but had the vague assurance that what was left might be removed during condensation. If the operator chose to wring out the entire mass of amalgam, he encountered the deleterious effect of early crystallization and subsequent difficulty in condensing a relatively crumbly material.

The purpose of this research, then, was to determine the amount of mercury necessary to produce an optimum result in the condensed amalgam and at the same time to be acceptable in plasticity during the condensing procedure.

It is here proposed that an amalgam mass of less than 50 per cent mercury in preference to a ratio of 8 parts of mercury to 5 of alloy as commonly used can be triturated in a mechanical amalgamator. This minimal-mercury mass can be condensed into a prepared cavity without

mulling or wringing out excess mercury to produce a restoration with a crushing strength in excess of 20,000 pounds per square inch (psi) in one hour and of 50,000 psi in 24 hours.

DISCUSSION

It has been generally accepted that a mercury-alloy ratio of 8:5 or of 7:5 triturated in a mortar and pestle would produce an amalgam mass fluid enough that a pestle could move through it, and dry enough to offer some resistance for complete amalgamation. With the advent of the mechanical amalgamator the same proportions were commonly advocated, even though the principle of trituration was entirely different from the mortar and pestle method. After triturating, the problem has always been the removal of surplus mercury from the mass so that the alloy particles would cohere to each other.

A well-condensed amalgam restoration regardless of the method of mercury removal would be expected to contain 50 per cent or less of mercury. The average mercury content of amalgams placed by hand and mechanical technics was 49.2 per cent as described in tests by Ryge and co-workers.[1] Link[2] stated that the restoration when condensed should contain equal parts of alloy and mercury. Keys[3] stated that after some mercury has been expressed it is expected that there will be a near 50:50 mixture of alloy and mercury in the finished restoration.

Phillips and Swartz,[4] reporting on 100 restorations selected at random, found mercury to be present in quantities varying from 28.6 to 61.0 per cent. Later studies[5] showed that although compressive strength was not altered appreciably by fluctuations in residual mercury content between the ranges of 50 to 55 per cent, there was a serious loss in strength when the mercury exceeded 55 per cent.

It must be established too that a dry mass of amalgam can be condensed well into a cavity preparation. Miller[6] reported that there had been no evidence that the common practice of starting the filling with mercury-rich amalgam had any benefit and sufficient proof that it did not. He also stated[7] that a restoration would have a better chance of success if the present practice of using more fluid consistency at the bottom of the restoration were discontinued, and in its place a procedure adopted in which the consistency of the amalgam being packed were uniform throughout.

Strader[8] stated that the variation in mercury between the top and bottom of the amalgam was alarming. Some variation might be eliminated if operators would discontinue using a more fluid bottom consistency and dry top consistency. This variation also results in a difference in expansion in various parts of the restoration, the bottom expanding three times as much in 24 hours as the top. This difference could explain the postoperative pain experienced by some patients after amalgam restorations have been placed. Packing amalgam of the same plasticity from bottom to top of the restoration should minimize unequal flow and expansion.

The problem in any acceptable amalgam technic is the removal of excess mercury, either by expression by wringing or removal with instruments from the prepared cavity during condensation. This procedure is controversial in that some operators feel that too dry a mass will result in layering, and that a layer of material too rich in mercury is necessary to pack against so that each successive increment coheres. The use of the minimal-mercury amalgam produces a plastic material that is cohesive without excessive surpluses of mercury.

DATA

The compressive strength of three brands of dental amalgam alloys was determined. The averages for the three brands ranged

Table 1 • Compressive strength values of three brands of amalgam alloy after 1 hour and 24 hours

Brand	Per cent mercury	Compressive strength (psi)	
		1 hour	24 hours
A	50	23,600 ± 2,200	58,600 ± 2,500
B	46	20,600 ± 800	54,600 ± 3,000
C	46	26,200 ± 1,000	61,500 ± 2,200

Table 2 • Compressive strength values of three brands of amalgam alloy after seven days

Brand	Per cent mercury	Compressive strength (psi)
A	50	58,100 ± 4,100
B	46	53,800 ± 3,900
C	46	63,000 ± 2,000

Table 3 • Dimensional change values obtained with three brands of amalgam alloy

Brand	Dimensional change (microns per centimeter)
A	−5.8 ± 1.9
B	−4.6 ± 0.0
C	−3.0 ± 1.4

from 20,000 to 26,000 psi in one hour and from 53,000 to 63,000 psi in seven days. These high strength ratings would appear to indicate rapid early crystallization, but ample packing and carving time are evident clinically; the material remains plastic enough for good condensation for over three minutes.

Four by eight millimeter dies were used for compressive strength tests. The specimens were well condensed, using 1 mm. and 2 mm. condensers with 10 pounds' packing thrusts, and small quantities of surplus mercury brought up as condensed. From five to seven minutes' condensing time was required for each specimen, measured from the beginning of trituration, and using multiple mixes as required to fill the mold. Five specimens of each brand of alloy for each of the compressive strength tests were prepared. The compressive strength values of the specimens after 1 hour and 24 hours are shown in Table 1.

The specimens for the seven day compressive strength tests were condensed with only moderate pressure, removing some excessive mercury but less than previously and were condensed in somewhat less time than previously—in four to four and a half minutes. The compressive strength values of the seven-day specimens are shown in Table 2.

It will be noted that the values obtained after seven days closely approximate those after 24 hours, because of the less exacting condensing procedures described previously.

Flow varied between 4 and 5 per cent at 37° C. Values would have been 30 to 40 per cent lower had tests been made at room temperature. Insufficient flow tests were obtained for purposes of tabulation.

Dimensional change tests were made with 5 by 10 mm. standard dies at 37° C. in 24 hours. Dimensional change values are the average of two to four trials, except where no standard deviation is noted, when only one trial was made. The dimensional change values are shown in Table 3.

Additional tests were made using much less condensing pressure and packing the dies in two minutes' time, possibly more nearly simulating mouth conditions on the average under clinical conditions. These specimens resulted in only a little less strength—22,300 psi in one hour, and contracted less—an average of 0.53 microns. Very likely further research will reveal methods for further reduction of shrinkage, perhaps through variation of the trituration time and composition of the alloy.

TECHNIC AND PROCEDURES

A fine grain alloy is the material of choice since a coarse material tends to bridge

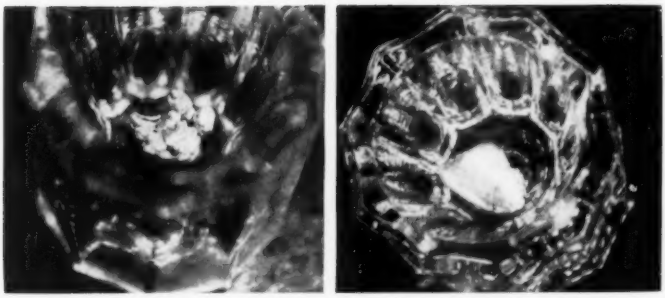

Fig. 1 • Left: Appearance of mass which is too dry for proper condensation. Right: Mass of proper consistency

and web during condensation. Since little or no excess mercury is to be expressed, alloy particles that will pack closely are desirable.

It was found that the proper mercury-alloy ratios to use varied with the brand of alloy. Brand A required about 50 per cent mercury; Brand B, 46 per cent and Brand C, 46 per cent mercury. The desirable amount of mercury may be related to the amount of annealing during the processing of alloy materials. All trituration was done with a Wig-L-Bug mechanical amalgamator for 12 seconds. Amalgam produced in these proportions will yield small quantities of mercury during condensation, if small instruments and adequate pressure are used.

Crescent alloy and mercury dispensers were used for all tests and were found to be easily adjusted and consistently accurate. The alloy dispenser proportions a constant amount, but the mercury dispenser can be regulated by a screw adjustment. To facilitate an accurate measurement, the operator can use pharmacy scales and quickly check his adjustments. The amount of alloy dispensed varies with the brand, so that the weight of the dispensed portion of alloy must first be determined. For example, if the alloy bottle dispenses 8 grains of alloy, then the mercury bottle should be adjusted to dispense 6.8 grains of mercury for a 46 per cent ratio.

Each individual's idea of a "right" consistency may need to be determined by experience, but an attempt will be made to describe a proper mix.

If the mass, as it comes out of the capsule, appears crumbly or in little ball-like clusters (Fig. 1, left), it is probably too dry and not plastic enough to condense properly, although some operators like the properties of a drier mix. If the mass appears in these clusters, it may be that only a slight increase in mercury will produce a desirable mix, which may be considered to be just slightly "wetter" than the clustered material, and will appear in one mass as it comes out of the capsule (Fig. 1, right). A freshly mixed amalgam of this consistency may appear slightly wet when condensed with small condensers. This surface temporarily too rich in mercury is apparent because such a short time has elapsed in triturating that the mercury has not had time to penetrate far into the alloy particles. This surface serves to secure the next increment as it is packed against it. By the time the last portion is carried into the cavity it appears quite dry but still plastic enough to condense.

Turning the screw of a Crescent mercury dispenser an eighth of a turn clockwise will increase the mercury dispensed by 0.35 grain, or about 1.4 per cent. This increase, or more, will still be well within safe limits for residual mercury

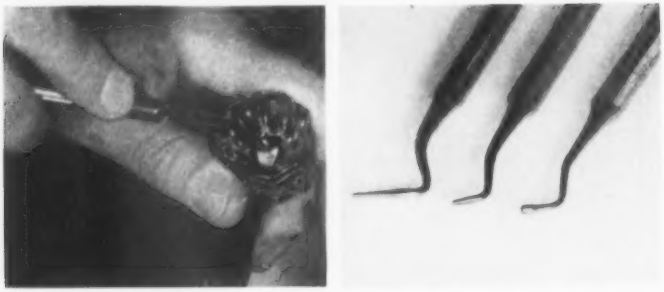

Fig. 2 • Left: Plunger type carrier used to pick up portions of amalgam from dappen dish. Right: Condensers—left, Wesco 0.5 mm. condenser; center, ground down Black's no. 1 condenser; right, Black's no. 1 condenser.

and will allow individual adaptation to this technic.

No mulling is ever indicated, so the mass is placed in a dappen dish directly from the capsule. The method of filling a carrier from a squeeze cloth has always proved awkward and frustrating to all but the most adept, so this simple procedure will greatly simplify the technic, since handling any amalgam mass is not indicated. A plunger type carrier is used to pick up portions of the amalgam from the dappen dish (Fig. 2, left). The parabolic shape of the dappen dish automatically feeds the carrier and quickly loads it with only a few thrusts. The carrier is unloaded into the prepared tooth either by the operator or his assistant. If the operator is working alone, he can easily load the carrier from the dappen dish on the bracket table.

Amalgam of this low mercury ratio exhibits the characteristic of having considerable "body," but still remains quite plastic and is easily moved in the preparation. Since the mass contains an optimum amount of mercury, the chief concern is not in removing excess mercury but in properly placing it into the prepared tooth. Excessive pressures are not indicated since the material does remain quite plastic, but it does require the use of small condensing instruments.

The first increment of amalgam is moved toward each line angle, undercut and point angle with a 0.5 mm. condenser. This condenser produces enormous pressure, and completely condenses the most inaccessible surfaces. A double-ended smooth condenser made by the E. F. Wessler Manufacturing Company called a Wesco 2 MO has a 0.5 mm. condenser on one end and a 1 mm. condenser on the other. Or if the operator prefers, he can in a few minutes grind down a Black's no. 1 serrated condenser to an approximate 0.5 mm. diameter (Fig. 2, right).

The bulk of the cavity is packed with a 1 mm. condenser, returning when necessary to the 0.5 mm. size. According to Markley,[9] "It is likely that if the operator's arm does not ache after condensing a large filling, the filling is not well condensed."

A condenser 0.5 mm. in diameter will produce a packing pressure four times that of a 1 mm. condenser and 16 times that of a 2 mm. condenser. The effectiveness of any condenser point is usually expressed in pounds per square inch of packing pressure. It has been shown by Skinner[10] that about 8,000 psi is an effective packing pressure for amalgam. A 10 pound packing thrust on a 1 mm. condenser yields slightly in excess of the desired 8,000 psi packing pressure and thus only 2½ pounds of packing thrust

would be necessary to exert this 8,000 psi with a condenser only 0.5 mm. in diameter. In large restorations the final packing can be done with a 2 mm. condenser, but it must be remembered that it would be necessary to pack with a force of 40 pounds to develop the 8,000 psi packing pressure, which is out of the question.

If multiple mixes are needed to complete a restoration, it is done in the usual manner. The shorter lapse of time in preparing successive mixes is conducive to a more successful restoration. Three minutes' packing time per mix is an accepted interval, although longer times may be used with a diminishing strength factor.

CLINICAL ASPECTS

Several thousand amalgam restorations placed within the past four years, using the low-mercury ratio, are being observed constantly through clinical recalls and are found to have all of the desirable characteristics resulting from any good technic. These restorations polish well, their margins are intact, probably because of their high compressive strength, and they do not tarnish. It is of clinical significance that restorations placed in this manner can be accomplished more quickly, because of less time required in preparing the material and less time required in condensing, and the resultant restoration will be stronger.

SUMMARY

A well-condensed amalgam restoration is expected to contain less than 50 per cent of residual mercury, and it has been shown here that an amalgam mass can be triturated containing a near-optimum ratio of less than 50 per cent mercury.

Amalgam triturated in this proportion exhibits more desirable clinical aspects in condensation and manipulation, since the time-consuming and erratic procedure of mulling and wringing excess mercury and the removal of residual mercury with instruments is virtually eliminated.

Since there is little or no excess residual mercury to remove, the operator needs to concern himself only with the proper condensation of the material.

This technic provides early strength values considerably higher than those usually expected. Routine clinical use for over four years confirms laboratory tests, and low-mercury restorations exhibit all the acceptable aspects resulting from conventional technics.

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Truth • Truth has no special time of its own. Its hour is now—is always . . . . *Albert Schweitzer.*

Social and economic changes affecting dental practice

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The demand for dental care in the United States is growing because of increases in population, life expectancy and family income, and because of improved dental health education programs and the development of various plans for the purchase of dental care. The capacity of private dental practice to meet the demand for dental care can be raised by increasing (1) the number of practicing dentists and (2) the efficiency of the dental office and the dentist.

Over the years and from year to year, there has been an increasing demand for dental care that, from all indications, will continue to increase at an accelerated rate. Among the many factors responsible for this are the following: (1) increase in population; (2) increase in life expectancy; (3) improvement in dental health programs; (4) increase in family income and (5) development of plans for the purchase of dental care such as those made possible by union-management health and welfare funds, government funds (public assistance welfare, Medicare, Veterans Administration), Blue Cross and Blue Shield, commercial insurance companies and dental societies and banks in the field of budget payment.

The effectiveness of programs for increasing the availability of dental care to all segments of the population through the facilities of private practice will depend on[1] the profession's ability to meet the demand for dental care and the profession's leadership in the development of methods for meeting the costs of dental care.

INCREASE IN POPULATION

It was predicted[2] that the population of the United States would increase by one third between now and 1975. A study[3] made by the Association's Bureau of Economic Research and Statistics showed that the number of graduates would be about 3,425 in 1961; 3,490 in 1962; 3,555 in 1963; 3,620 in 1964; 3,685 in 1965; 3,750 in 1966, and 3,815 in 1967. Although these were substantial increases, the study showed that the expected number of graduates would not be sufficient to maintain the present population-dentist ratio.

With regard to auxiliary personnel,[2] it has been found that, despite the phenomenal growth in the number of dental hygiene schools and the greatly accelerated rate of graduation—from 14 schools graduating 399 hygienists in 1946 to an

expected 39 schools graduating 1,300 in 1951—the current number of 9,000 hygienists does not represent much of an increase, because most dental hygienists do not remain long in the profession.

The manpower situation with regard to the number of full-time dental assistants, secretaries and receptionists is more encouraging.[2] In 1952, the dental assistants numbered 45,000, secretaries and receptionists, 11,600, a total of 56,600. In 1955, the figures were, respectively, 62,000 and 10,900, a total of 72,900. This increase of 16,300, or 29 per cent in only three years, is credited for part of the increase in the number of patients reported by dentists.

INCREASE IN LIFE EXPECTANCY

Life expectancy at birth in the United States in 1954 was 67.4 years for males, 73.6 years for females; for both sexes, 70.3 years.[4]

Whereas the 10 to 19 age group is expected to increase by nearly 12 million, or 48 per cent, each age group above 40 will also increase substantially.[2] Since the number of teeth requiring fillings is higher among dental patients in the 15 to 19 age group than in any other age group[5] and the rate of tooth loss increases after people reach the age of 35 or 40 because of periodontal diseases, the anticipated changes in the age curve of the population should not effect a change in the patient load of dentists.

DENTAL HEALTH EDUCATION PROGRAMS

An American Dental Association booklet[6] defines dental health education as "a process which uses many different media, such as radio, television, the printed word, exhibits, the lecture platform, group discussion and person-to-person contact, to induce people to act in such a way as to result in better dental health for them, their families and the community."

All dental health education programs are intended to bring before the public the fact that dental health is a part of total health. A recent study in Missouri[7] illustrates clearly the part that education will play in an increased demand for dental care. According to the study, the number of families who had been to a dentist within a two-year period was greater among families with children 16 years of age or younger than among families not having children. It was concluded that exposure to dental service through their children acts as a stimulus to parents in obtaining care. The fact that they are exposed to the public health education programs in their schools through their children was thought to be a strong factor.

FAMILY INCOME AND DEVELOPMENT OF PAYMENT PLANS

For the past ten years, there has been a gradual increase in family income. The average family income for 1956 was $5,736, or $271 greater than in 1955, according to the magazine, *Sales Management*.[8] To be sure, there has been an increase also in the cost of living, but the increase in the average family income has been sufficient to permit greater purchase of dental care.

For many years, labor unions have been bargaining for and obtaining fringe benefits for their members, such as pensions and other retirement benefits. The health and welfare fund, however, is a development of recent years and is administered separately as a distinct trust. Among the benefits it may provide are payments for the costs of medical—including dental, surgical and hospital—care for illness or injury arising outside the scope of employment. Dependents of employees may also be included as beneficiaries.

In the Veterans Administration dental program, it is estimated that 85 per cent of the care is provided through the facili-

ties of private practice. These facilities also are expected to feel the impact of the recently established program of the Department of Defense for the medical care of dependents of military personnel (Medicare).

In connection with programs dealing with vocational rehabilitation and chronic illness, there are large areas of responsibility for the providers of health services. At the chronic illness workshop sponsored by the St. Louis Dental Society and the Public Health Service recently at Washington University School of Dentistry,[9] it was pointed out: (1) that there was a community as well as a professional responsibility; (2) that financial responsibility for services rested with the patient, the family, the community, the state and the federal government, in that order, (3) that since chronic illness, in many instances, is such a drain on individual and family resources, many patients with long-term illnesses are forced to turn to the state for financial aid and medical care. Matching federal funds are now available to the states to provide more dental care for patients who are in need of public assistance.

If the condition is acute, certain medical and surgical procedures may be performed legally in hospitals by dentists or physicians and be covered by the Blue Shield and Blue Cross policies in effect in various states. Such procedures are covered also in many commercial insurance policies. However, direct payment to the dentist under both types of insurance programs has been a problem that is engaging the attention of the dental profession in the interest of both the public and the profession.

A budget payment plan for dental care is a mechanism for financing the purchase of such care by an individual at the time of need. Such a plan is sponsored by a dental society in cooperation with a bank or banks in the area. Although such a plan makes care available on an individual basis to a patient who is not a member of a group and who does not have access to the health benefits of such group membership, it is the group resources of the dental society that make the plan possible. The withholding of a percentage of the dentist's fee in each instance—from 2 to 5 per cent—builds a reserve fund to cover notes that may be defaulted by a patient.

AVAILABILITY OF DENTAL CARE

Factors that will create a greater demand for dental care have been reviewed. Now, methods for meeting those demands will be considered. Increasing the availability of dental care to all segments of the population will depend on[1] increasing the efficiency of private dental practice to meet the demands for dental care and improving the methods for meeting the costs of dental care.

Increasing Capacity to Meet Demand • There are two obvious solutions to the problem of increasing the volume of dental care to meet the demand for such care: (1) by increasing the number of practicing dentists; (2) by increasing the efficiency of the dental office and the dentist.

As was pointed out earlier, promising efforts already are underway to increase the number of graduates through the establishment of new dental schools and the enlargement of existing ones. As was pointed out also, the increase in number of dentists will not begin to keep pace with the predicted increase in population and its accompanying dental needs. Consequently, an attempt to achieve more dental care for more people solely through the training of more personnel would be unrealistic. The attempt will have to be supplemented by a practical program that will result in a greater volume of dental care from the dental office.

Increasing the efficiency of the dental office will be contingent on developments in dental research, employment of pre-

ventive methods, enlightenment of the public through effective dental health education programs, limitation of dentist's activities within the office to strictly professional functions, absorption of young dental graduates into established practices, intelligent utilization of auxiliary personnel, efficient design and arrangement of the office to effect savings in motion and time on the part of the dentist and his staff, and development of more efficient and functional equipment.

Fluoridation may be cited as "the ideal example" in demonstrating the direct benefits of research to the public. The discovery that nature's precedent for preventing tooth decay could be duplicated by man—safely, effectively, economically—required years of painstaking research. More than 32 million persons in this country are now consuming fluoridated water routinely through some 1,500 community programs. Another 3.5 million persons are served by water supplies that contain an optimum amount of fluoride naturally. New projects are reported each month by the U. S. Public Health Service, and it is expected that the benefits of the measure eventually will be made available to all communities served by public water supplies. In other areas, topical fluoride application undoubtedly will continue to be the procedure of choice until research efforts lead to the development of a safe and effective unit for fluoridating individual water supplies.

Prevention of dental decay will be accompanied, of course, by a reduction in the need for restorative dentistry. The private practitioner, then, will be able to devote more attention to problems brought on by occlusal wear and periodontal disease.

Seven objectives approved by the American Dental Association[10] have helped to bring about the increasing enlightenment of the public through effective dental health education programs. The seven objectives recommended for any state dental health education program are:

1. Help every person appreciate the importance of a healthy mouth.
2. Help every person understand the relationship of dental health to general health and appearance.
3. Encourage the observance of dental health practices, including personal care, professional care, proper diet and oral habits.
4. Enlist the aid of all groups and agencies interested in the promotion of health.
5. Correlate dental health activities with general health programs.
6. Stimulate the development of resources for making dental care available to all children and youth.
7. Stimulate dentists to perform adequate dental health services for children.

Consideration of four aspects has been found essential in implementing the foregoing objectives.[6] They are (1) education of the dentist through the society's newsletter, journal and other publications and through study groups and conferences; (2) development of an effective dental health education program in the schools as outlined in the Association's manual, *The Role of the Dental Society in the School Dental Health Educational Program;* (3) education of the patient in the dentist's office through the distribution of up-to-date pamphlets, utilization of roentgenograms, slides, charts and models to illustrate the patient's dental condition and the results of treatment and desirable dental health practices, including proper toothbrushing methods; (4) education of the public through a public dental health education program, including the dissemination of information through a speakers' bureau and through utilization of newspapers, radio and television where possible.

Limitation of the dentist's activities within the office to strictly professional functions is another realistic method for

increasing the volume of dental care. It is obvious that the dentist cannot attain his maximum capacity of professional care if he acts as secretary, assistant, technician and, sometimes, janitor. The Richmond-Woonsocket studies[11] have shown that a significantly greater amount of dental care can be rendered by the individual dentist who has the assistance of trained auxiliary personnel.

Another promising source of increased dental care lies in the better utilization of new dental graduates. The traditional procedure for young graduates to establish new dental offices with relatively low productivity during the early years of development of their practices results in economic loss both to the community and the dentist. This problem is one of the aspects of dental practice that will be considered by the Council on Dental Health in its long-range study of dental practice.

Intelligent utilization of auxiliary personnel has been found to lead to a 33 to 75 per cent increase in the patient load per dentist.[12,13] The dental officers in the Richmond-Woonsocket studies[11] felt, however, that the foregoing estimates were conservative. As yet, the maximum capacity of high-quality dental care that can be attained in minimum time through effective teamwork between the dentist and auxiliary personnel has not been established. A workshop conducted by the Council on Dental Education to study the role of the dental assistant contributes helpful information in regard to the preparation of the assistant for maximum effectiveness as a member of the dental health team.[14]

Another source of economic loss to the dentist and the community is the poorly designed and arranged dental office. The Council on Dental Health has held a conference with industrial engineers to determine the aspects of dental practice that must be studied in order to determine the most efficient office layout. Conferences with architects will follow in order to set up specific studies that should lead to recommendations on optimum size and arrangement in accordance with the type of practice, number of personnel and so on. Conferences will be held also with equipment manufacturers to arrange for studies regarding the development of more efficient and functional equipment.

The studies of the physical layout of the dental office must be accompanied by studies to determine the most efficient application of sound business principles to the dental practice. Appropriate investigations are under way by the Council.[5]

Although there is a significant trend toward the establishment of group practices, up to this time, it has been possible to accumulate little information on the details of such practices. There is need for studies on the business and legal aspects of group practices, methods for distribution of income, use of cost accounting and personnel management procedures. Such information will be of value not only to dentists beginning group practices but to established groups that need ideas for increasing their effectiveness.

Methods for Meeting the Costs of Dental Care • There are three methods for meeting the costs of dental care: (1) direct purchase by the individual through his own personal resources; (2) purchase by an individual through an organized program (budget payment), (3) purchase by a group for its members through an organized program. The Council is exploring a fourth method: application of the insurance principle.

The first method, which is older than the dental profession itself, is merely the application of the principle of cash purchase of a product to procurement of dental service.

The second method is the familiar time payment procedure, with the group resources of the dental society being made available to an individual as security for

his loan from a bank. Such plans have been found beneficial both to the patient and the dentist. The patient receives the necessary treatment at the time of need and thereby reduces the unavoidable outlay of more costly amounts which result from a worsening condition; the dentist receives his fee immediately at a cost of from 3 to 5 per cent which is deducted and placed in a loss reserve fund to protect the bank and to eliminate the need for recourse to the dentist in the event the patient defaults on his loan. The discount fee has been found to amount to less than the cost of overhead involved in the customary billing operation and the cost to the dentist for fees which have not been paid.

The Council on Dental Health has made an exhaustive study of the application of the budget payment mechanism to the provision of dental care and has found that millions of dollars in such care have been made available to thousands of persons, thus pointing to the effectiveness of such plans in increasing the availability of this health service to the public. The Council's findings have been compiled in a manual to guide dental societies in the establishment of such programs and in the improvement of existing ones. The Council's findings also led to the development of a set of principles for evaluating such plans. These principles were approved by the House of Delegates of the Association at the 1957 annual session.

The manual has been printed in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION[16] so that every dentist may have the information available for his personal reference.

Budget payment plans also received considerable attention at the Eighth National Dental Health Conference held in April 1957 in Chicago. The four papers presented on this subject were published as a symposium in the February 1958 issue of THE JOURNAL.[17-20]

The Council on Dental Health is continuing to compile information on group plans for the purchase of dental care. The booklet, *Group Dental Health Care Programs*,[21] published in 1955, has had wide distribution, and the Council continues to disseminate information on new developments in this field through its newsletter, *Dental Health Highlights*.

Various aspects of group purchase programs have also been explored extensively at the annual National Dental Health Conference. The possibilities of the dental service corporation in administering such programs are increasingly promising. Their effectiveness has been demonstrated, in particular, by dental societies on the West Coast where such corporations already administer dental programs sponsored by labor-management health and welfare funds and public welfare departments. The development of such corporations has alerted the dental profession to their usefulness in the administration of various types of dental care programs, and the Council on Dental Health has repeatedly recommended to state societies that they seek competent legal counsel regarding the status of the dental service corporation in their respective states.

Recent developments at the federal level of government in the provision of certain health care services for dependents of military personnel, popularly known as Medicare, make it imperative for all state societies to conduct continuing studies of the fee structures in their respective states. Moreover, such studies prepare the dental society to meet the requests of any group for a dental care program—government, labor, industry, nonprofit or commercial insurance. The Bureau of Economic Research and Statistics will assist state dental societies in the conduct of such fee surveys by making questionnaires available free of charge and by providing technical advice as well as preparing a summary report of the survey results.

The need for adjustment to assure the

allowance of dental claims under Blue Shield is a problem that has been receiving increasing attention from state dental societies as a service to the public. Several states, such as Pennsylvania, Massachusetts, New York and Oregon, have set examples for negotiations with Blue Shield that might well be followed in other states. The Councils on Dental Health, Hospital Dental Service and Legislation of the Association have been collecting pertinent information from state dental societies and, on the basis of the experience in the various states, prepared a joint report for consideration by the House of Delegates at the 1957 annual session.[22] The Councils' recommendation was approved that "in the best interest of the subscribing public, constituent dental societies be urged to insure that Blue Shield plans in their respective states provide for direct payment to dentists for those procedures which may be performed legally by both physicians and dentists."[23]

Experience has shown also that, under commercial insurance contracts, policy holders frequently are unable to collect for certain acute medical and surgical procedures covered by their policies when those procedures are not performed by a physician, regardless of the fact that the dentist is legally and professionally qualified to do so. The Council on Dental Health recently held a conference with representatives of the Health Insurance Association of America in which problems in the administration of claims were discussed. The discussions provided the basis for the recommendations contained in the section on commercial insurance policies in the previously mentioned joint report.

In the report is a "Statement of Policy of the American Dental Association on Medical and Surgical Care Rendered by Dentists Under Commercial Insurance Contracts" which the House of Delegates approved.[23] The statement expresses the objective of the Association as "to assist in the development of a more effective interpretation of existing health insurance contracts to provide a more satisfactory administration of claims under the contracts so that allowed procedures performed by qualified dentists will entitle the policy-holders to reimbursement for the cost of such procedures." The statement concludes with the recommendation that "where a constituent dental society is in a position to negotiate effectively with an individual insurance company, that society should consult first with the American Dental Association in order that all efforts may be completely coordinated."

SUMMARY

To summarize, many of the social and economic changes that will affect the conduct of the dental practice have been described. All point to the need for increasing the availability of dental care through increasing the efficiency of private dental practice and through improving the methods for meeting the costs of the care.

Efforts are being made by the dental profession to meet the challenge of increasing the availability of dental care. It remains, however, for the individual dentist, fulfilling his responsibility of professional leadership in his community, to implement organized dentistry's efforts to improve the dental health of the public.

33 North Meramec Avenue

*Member, Council on Dental Health, American Dental Association.

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Reverence of Life • Because I have confidence in the power of truth and of the spirit, I believe in the future of mankind. Ethical affirmation of the world and life contains within itself an optimistic willing and hoping which can never be lost. . . .

In my own life anxiety, trouble and sorrow have been allotted to me at times in such abundant measure that had my nerves not been so strong, I would have broken down under the weight. Heavy is the burden of fatigue and responsibility which has lain upon me without a break for years. I have had not much of my life for myself, not even the hours I should like to devote to my wife and child.

But I have had blessings too: that I am allowed to work in the service of mercy; that my work has been successful; that I receive from other people affection and kindness; that I have loyal helpers who identify themselves with my activity; that I enjoy a health which allows me to undertake most exhausting work; that I have a well-balanced temperament which varies little, and an energy which exerts itself with calmness and deliberation; and, finally, that I can recognize as such whatever happiness I encounter, accepting it also as a thing for which some thank-offering is due from me.

I feel it deeply that I can work as a free man at a time when an oppressive lack of freedom is the lot of so many, as also that though my immediate work is material, yet I have at the same time opportunities of occupying myself in the sphere of the spiritual and intellectual.

That the circumstances of my life provide in such varied ways favorable conditions for my work, I accept as something which I would fain prove myself worthy.

How much of the work which I have planned and have in mind shall I be able to complete?

My hair is beginning to turn. My body is beginning to show traces of the exertions I have demanded of it during the passage of years.

I look back with thankfulness to the time when, without needing to husband my strength, I could get through an uninterrupted course of bodily and mental work. With calmness and humility I look forward to the future, so that I may not be unprepared for renunciation if it be required of me. Whatever we be, workers or sufferers, it is assuredly our duty to conserve our powers, as being men who have won their way through to the peace which passeth all understanding.—*Albert Schweitzer, This Is My Philosophy, edited by Whit Burnett, Harper & Brothers, 1957.*

cases and comments

ECTODERMAL DYSPLASIA

By Anthony Ippolito, D.M.D., Lawrence, Mass.

About one year ago, a four year old boy was brought in for dental observation. The patient's condition was so rare and interesting it was decided to check all details and to proceed with caution.

At the age of one year the boy had been referred to Forsyth Dental Infirmary, Boston, by Milton J. Meyers who was a visiting orthodontist at the Infirmary. Examination was made with regard to the boy's ectodermal dysplasia and the effect of this condition on his deciduous and permanent dentition.

The mother reported that there had been no history of this condition in the families of either parent. The course of her pregnancy was uneventful with no nausea, vomiting or other illnesses.

The child was seen for the first time at the age of one year and was subsequently seen every six months up to the age of four years and one month.

Wrist, skull, and dental roentgenograms were taken, as well as color photographs of his face and breasts. No abnormalities were noted on wrist and skull roentgenograms. Dental roentgenograms revealed many congenitally missing teeth.

Warren R. Sisson, M.D., chief of the pediatric department of the Forsyth Infirmary, summarized his data as follows:

"Donald's growth and development appear to be within normal limits. He walked at one year and talked at 15 months. He is in the 75th percentile for both height and weight. His appetite is good although he must eat soft foods.

"His skin seems a little dry but smooth, with a yellowish tinge. The finding of particular note concerns the mammae. The right is a little smaller than the expected with a vestige of a nipple and a slight pigmented area. The left, in contrast, is much smaller and looks like a little cafe-au-lait spot. There is no suggestion of mammary tissue. The difference between the two mammae and the atrophic condition of the areola and nipple is significant.

"The nails look perfectly normal. The hair

Fig. 1 • Child's natural dentition at age of four years

Fig. 2 • Mouth prepared for partial upper denture and complete lower

Fig. 3 • Dentures in place in the mouth of the child

Fig. 4 • Dentures for 4-year-old child with ectodermal dysplasia

is distinctly sparse, and one can see the scalp at all points. It is cut every six weeks because it gets too long. The eyebrows and eyelashes have improved a little since our first examination but are still almost absent except that on careful examination a small lanugo-like growth involving the basal portion of eyebrows and eyelashes can be seen.

"The ears are well-formed but the tragus seems to be extremely small, and there is a definite hiatus between the attachment of the tragus to the skin of the face giving the appearance of a distinct U-shaped area.

"The eyes were examined with reference to possible cataracts, but none could be detected. It is apparent that he sees well, and there is no problem which seems to be related to any ocular defect.

"The boy never sweats. It was suggested that he be given a sweat test at the Children's Hospital when he is a little older and can verbalize better. He finds hot days and hot rooms distinctly depressing and his behavior and general activities are modified by this condition.

"The outstanding feature of this boy is his facial expression. He has the facies of an edentulous man, with bulging lips and a marked depression of the maxilla and mandible, especially in the frontal region.

"This little patient is a friendly, well-adjusted boy who behaves well and shows every evidence of grasping situations easily. One is impressed by his good physical development, his pleasant, cooperative disposition, and his fine intellect which could be directed to compensate for his liabilities."

At the age of four and a half years he had four upper deciduous teeth, a cuspid and molar on each side. There was the beginning of an eruption of the lower right deciduous molar. Roentgenograms revealed no other deciduous teeth or permanent tooth buds.

The parents were concerned with his inability to masticate hard foods and the fact that he was to enter primary school soon. The only solution was to make a partial upper denture and a complete lower denture. The four upper teeth were conical in shape and could not be clasped. To remedy that situation full gold crowns were made on the deciduous molars and cast acrylic veneer crowns were made on the cuspids. Upper and lower impressions were taken with special home-made individual trays. An acrylic partial upper denture with cast clasps was made, and also a complete lower acrylic denture. The dentures were inserted at the same time and he learned how to use them in a few days. Comments from his parents were that his appearance was pleasing and that he ate very well.

All this work was done with more cooperation than I have had from any adult patient.

The case is not concluded for as the boy grows older changes will have to be made in his dentures. *90 East Haverhill Street*

ONE-STEP ROENTGENOGRAM DUPLICATION METHOD

By J. Joel Milder, D.D.S., Chicago.

Often duplicate copies of roentgenograms are needed and the only way to obtain them is to subject the patient to further radiation. Duplicates of roentgenograms of important cases can often be used to advantage in correspondence with other dentists and as teaching material. The two-film dental x-ray film packet provides two identical roentgenograms which can be used for this purpose but often additional duplicates are required. There is a method by which a dental roentgenogram can be duplicated quickly and easily by any dentist or his assistant. The method is termed "solarization" because sunlight is sometimes used for making the exposure. Several notations using similar methods have appeared in the general literature,[1-4] but these have not been readily available to the dental practitioner.

Above is the original roentgenogram and below the "solarization" duplicate. The duplicate will retain the image as long as the original.

Photographic Terms • A roentgenogram is actually, of course, a negative, even though members of the profession have accustomed themselves to making a study of this film as the final view upon which to base their diagnoses. Ordinarily a print on film or paper that is obtained directly from a photographic positive is called a negative except when one-step methods are employed. Solarization or reversal processing is a one-step method which can be used for making usable copies of dental roentgenograms in a very simple manner.

When an x-ray film is exposed briefly to light it becomes overexposed and development would, of course, reveal a totally black film. However, if a film were exposed long enough it would change progressively from black to gray depending on the time along the progression from black to gray at which it is developed. This reversal process of solarization, though unknown to most dental practitioners, can be used to advantage for obtaining simple one-step duplication of x-ray films.

Material Needed • A contact printing frame should be obtained for the size of film to be duplicated. A 35 mm. printing frame is suitable for intraoral dental films.

Occlusal x-ray film or any "Blue Brand" (Kodak Medical x-ray film) has an emulsion suitable for the reversal process of solarization. Occlusal films are found in most general practitioners' offices and "Blue Brand" films are found in offices where jaw and skull films are taken. Dental periapical and bitewing films will not receive the image from the original through solarization.

Procedure • The entire duplication process can be accomplished in a lighted room. The film is cut to the size of the film or films to be duplicated; care must be taken not to mar the film with fingerprints or dust. During the cutting, the film should not be exposed for over two or three minutes; to avoid further exposure at this time the film should be stored in a dark envelope.

The films are placed in the contact printer in the same way as that used for contact printing. The contact printer is then placed, window down, on an x-ray illuminator for an exposure from 7 to 10 minutes. If exposed to bright sunlight, 30 seconds will give good results. A 100-watt bulb at 20 inches for 30 minutes can be used. If photoflood lamps can be used for illumination, the exposure time is reduced to 10 seconds at 20 inch distance.

For any method of illumination, if the resultant films are too dark, the exposure time is increased, and if they are too light, the exposure time is decreased.

In developing the solarized film, precisely the same procedure is used as with x-ray exposed film; however, the room does not have to be in total darkness. When properly fixed and washed, the duplicate will retain the image as long as the original.

Theories Involved • There are two theories on the mechanics of the reversal process—the "development" theory and the "latent image" theory.

The "development" theory presupposes that on the solarization region a layer of pure silver so surrounds the silver halide grains that the developer is unable to reach them freely, access being determined by exposure.

The "latent image" theory presupposes that there is an actual coagulation or destruction of the image and that this is probably due to the action of bromine liberated by continued photochemical decomposition of silver bromide during exposure.

Summary • Solarization is a remarkable process of x-ray film duplication which, although not known to most dental practitioners, can be used to their advantage. With the aid of only a contact printing frame, any dentist or

dental assistant can make duplicate copies of important roentgenograms.

Zoller Memorial Dental Clinic
University of Chicago, 950 East 59 Street

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PERIAPICAL ABSCESS

By Ignatius N. Quartararo, D.D.S., New York.

This report describes how an inflammation of pulpal origin was differentiated from a suspected periodontal abscess.

The patient appeared for examination of the lower right cuspid and first bicuspid at the endodontics department of the New York University College of Dentistry. The cuspid had large mesial and distal cavities and gave no response to electric pulp testing. The bicuspid had a labiogingival cavity which exposed the pulp chamber and pulp testing indicated a vital pulp. No subjective symptoms were present.

Root canal therapy was begun on the cuspid on January 15, 1958 (Fig. 1). A pretreatment culture was taken which was positive. After instrumentation a second culture was negative.

Five days after the first treatment the patient returned with enlargement of the submaxillary lymph nodes and with tenderness and induration over the border of the mandible. The cuspid exhibited a definite pericementitis. The seal was removed and parenteral penicillin prescribed. Hot saline irrigation and ice packs, as usually prescribed in acute inflammation, were instituted and the root canal was left open.

The expected response to this therapy did not follow. The patient was observed over a three week period, during which time improvement was gradual. Mild lymphadenitis and slight tenderness to pressure in the mucobuccal fold persisted.

In the fourth week a fistulous opening appeared immediately below the labiogingival margin of the adjacent first bicuspid. The lymphadenitis and tenderness were absent and only a "little soreness remained, and the area felt better than ever." Both the cuspid and bicuspid were plainly mobile. A roentgenogram taken at this time disclosed a pronounced change from the original: considerable radiolucency was evident in the region between the cuspid and first bicuspid. A larger, more diffuse radiolucency, which was confluent with the interproximal radiolucency, was evident about the apex of the cuspid. A fine white line was present which corresponded with the height of the interproximal septum in previous films (Fig. 2).

From the roentgenographic appearance the possibility existed that the bone changes were of either periodontal or pulpal origin. Since exact knowledge of the vitality of the bicuspid was deemed most significant and electric pulp testing was inconclusive, the occlusal enamel was penetrated with a bur. A definite pain response was obtained immediately on entering dentin and was accepted as conclusive evidence of vitality.

Fig. 1

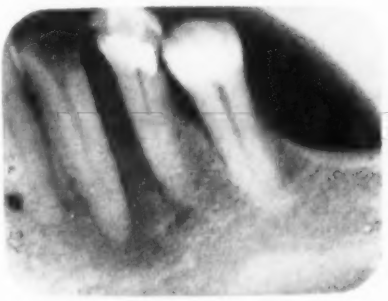


Fig. 2

Fig. 3

Fig. 4

To demonstrate the relationship between the fistulous opening on the labiogingival margin of the bicuspid and the inflammation at the apex of the cuspid, a gutta-percha cone was used to probe the fistulous tract. The cone traversed the thinner bony region visualized on the roentgenogram and terminated in the apical section of the cuspid, proving that the fistulous tract originated at that site (Fig. 3).

Treatment of the cuspid was continued and carried to completion (Fig. 4).

A roentgenogram taken at the time of the patient's dismissal indicated increased radiopacity in the interproximal region (Fig. 5).

Comment • This case report illustrates the need for clear differential diagnosis between periodontal and periapical abscesses in the presence of acute inflammation during endodontic therapy. *5 East 57th St.*

Fig. 5

Traits of the Foolish • A foolish man can easily be recognized by six symptoms: anger without cause, speech without reason, change without progress, injury without object, trust in total strangers, and acceptance of enemies as friends. *Thales (624-554 B.C.).*

editorials

Rising costs plus declining dollars force raise in membership dues

Members of the House of Delegates at the forthcoming one hundredth anniversary of the Association will determine whether membership dues shall be increased as was proposed last year at the meeting in Dallas. During the next six months every conscientious delegate will acquaint himself with all the facts in the case so that he can vote intelligently on the proposal next September. Is a raise in dues at this time essential to the welfare of the Association membership? If so, how great should that raise be? The answers to those and many other pertinent questions are in the hands of each delegate now. They are contained in the 13 page report which the Board of Trustees presented to the House of Delegates last fall.

It is not necessary, however, for the delegate to read the report to learn that operative costs have risen consistently over the past decade, nor is it necessary to read the report to learn that to remain solvent the dentist—like the business man—has had to increase fees to compensate for increased costs. These simple economic facts are well known to every dentist who has maintained a practice during the last ten years. The dollar today is not the dollar of a decade ago, and the impact of its declining value has been felt no less by the Association than by each of its members.

Take, for example, the rising costs of publishing THE JOURNAL, a subject about which the editor is somewhat familiar. In 1948 the net cost of THE JOURNAL was $121,309.56. By 1958 it had risen to $178,022.38, an increase of 47 per cent. A great number of factors contributed to that increase—too many to be enumerated here. Chief among them was the increase in cost of labor and materials.

Between 1947 and 1957 the average wage increase in the plant which prints THE JOURNAL was 58 per cent. During that period compositors' wages increased 57 per cent; pressmen's wages increased 58 per cent. The wages of pressmen's assistants increased 53 per cent. Bindery girls' wages increased 70 per cent and the wages of miscellaneous help increased on an average of 60 per cent.

Wages in the engraving industry increased even more during that period. In the ten year period of 1947-1957 the wages of photo-engravers increased 67 per cent. The cost of materials such as copper, zinc, wood and other engraving items increased 77 per cent, making a general average increase in engraving costs of approximately 70 per cent. Additionally, the price of JOURNAL paper rose 34 per cent during that same period.

These increases in operative costs are not confined to THE JOURNAL nor to the editorial department. They are reflected in every other activity of the Association and, judging by the opinions of the country's leading economists, there is little likelihood that spiraling prices will spin more slowly in the foreseeable future.

Thirteen years ago the Association was faced with this same situation—rising costs and spiraling prices—caused by the war. Unfortunately the Association had not prepared itself to meet the upward economic trend, with the result that for two years—1947 and 1948—it had to draw heavily on its reserves and to curtail many of its essential activities until it had adjusted its income to conform to the demands on its services and in line with mounting prices.

That episode occurred much too recently and is too firmly fixed in the minds of many members to allow it to occur again.

The ten dollar increase in dues recommended by the Board of Trustees is sound business. It will permit the Association to continue all of its essential activities and services at their present level and to better those which, in the interest of the public and the profession, could be improved.

Coming In the June issue of The Journal: a many-sided history of the Association

Readers of THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION have a rich treat in store with the June Centennial issue. Its enlarged contents will be devoted entirely to a synoptic history of the American Dental Association and to the Association's contribution to the progress of the dental profession.

J. Ben Robinson, Harold L. Faggart and Lon W. Morrey have collaborated on a history of the first one hundred years of the Association. Thomas J. Hill, George C. Paffenbarger, Wilmer Souder, F. A. Arnold, Jr., Floyd D. Ostrander and B. Duane Moen have contributed to a symposium on the Association's role in the progress of dental science. Harlan H. Horner, Gerald D. Timmons and Philip E. Blackerby, Jr., discuss the Association and dental education. Gordon L. Teall writes on the National Board of Dental Examiners, and J. Ben Robinson on the American Association of Dental Examiners. The 256 page issue will include an article by Louis M. Cruttenden on the American Dental Association's Relief Fund, one by N. C. Hudson on the Association's successful fight to oppose process patents, and an article by Willard C. Fleming on dentistry of tomorrow. No effort has been spared to make the June issue a significant contribution to the Centennial of the Association, an issue to be preserved for future reference.

Plague on the plagiarist

Once again it becomes necessary to protest against the practice of plagiarism—literary larceny—which occasionally creeps into dental journalism. In all fairness it must be stated that extensive dental plagiarism is becoming relatively rare. Therefore, when it does occur, its appearance is little less than shocking. Such an incident is responsible for this remonstrance.

An Italian dental professor, who shall be nameless, is terribly upset because several whole paragraphs from an article of his published in 1954 were used, he claims, without giving him credit in a book published in 1957 by two American dentists.

THE JOURNAL has no intention of sitting in judgment on the charges but it has decided to publish them together with some of the evidence presented by the Italian professor as a thorough airing of the unpleasant incident might deter others, who would neglect to use appropriate quotation or reference marks in appropriate places.

Following is a short paragraph as it appeared in the original nineteen fifty-four article and as it reappeared under different authorship three years later:

ORIGINAL STATEMENT

The most ancient specimen of a dental implant ever recorded seems to date as far back as the pre-Colombian era. According to Andrews (1893), at the Peabody Museum, Harvard University, there was a skull from such period discovered in Honduras. An artificial tooth carved from a dark stone was found to replace a lower left second incisor. The calculus on it would seem to show that it had been worn for some time during life. In modern times, many authors were interested in the simplest forms of dental endo-osseous implants. Maggiolo (1809) described the insertion of gold roots as support for pivot teeth (fig. 1A). Harris (1887) used teeth made of a porcelain crown into which a lead-coated platinum post was fitted to obtain a radicular form. Lewis (1889) tried to insert a tooth with porcelain crown and platinum root. Berry (1888) applied lead roots. Similar implants were reported by Edwards (1889) and Gramm (1898). Edmunds (1889) devised as a root a lead-coated platinum shell on which a crown was placed. Znamenski (1891) implanted artificial teeth in porcelain, rubber or gutta-percha, with grooves in the radicular parts to facilitate tissue adhesion.

RESTATEMENT

The most ancient specimen of a dental implant ever recorded seems to date as far back as the pre-Columbian era. According to Andrews[19] (1893), at the Peabody Museum of Harvard University, there was a skull from such a period discovered in Honduras in which an artificial tooth carved from a dark stone replaced a lower left second incisor. The calculus on it would seem to show that it had been worn for some time during life.

In modern times, many authors have been interested in the simplest forms of dento-endo-osseous implants.

Maggiolo[20] (1809) described the insertion of gold roots a support for pivot teeth.

Harris[21] (1887) used teeth made of a porcelain crown into which a lead-coated platinum post was fitted.

Berry[22] (1888) applied lead roots.

Lewis[23] (1889) tried to insert a tooth with a porcelain crown and a platinum root.

Similar implants were reported by Edwards[24] (1889) and Gramm[25] (1898). Znamenski[26] (1891) implanted artificial teeth in porcelain, rubber or gutta percha, with grooves in the radicular parts to facilitate tissue adhesion.

It is unnecessary to report here all of the disputed passages. One more is added, however, by way of emphasis:

ORIGINAL STATEMENT	RESTATEMENT
Charad Nur (1946) tried immediate restoration with acrylic teeth. McCall (1946) reported a screw-shaped implant he had inserted with Wesoke in 1940. Formiggini (1947) gave his implant a spiral form (direct endoalveolar infibulation), with good results (fig. 1D). Kelly (1948) replaced an upper incisor with an acrylic tooth. Porcelain and acrylic teeth were tried by Neugebauer (1949). Lubit and Rappaport (1949) shaped screw and cage-like inclusions (fig. 1E-F). The endo-osseous implant of Svedion-acrylic teeth was performed by Laforgia (1953). A group of French authors has used acrylics widely, both alone and coupled to metallic structures.	Charad Nur (1946) tried immediate restorations with acrylic teeth. McCall (1946) reported a screw-shaped implant he had inserted in 1940. Formiggini (1947) gave his implant a spiral form. Kelly (1948) replaced an upper incisor with an acrylic tooth. Porcelain and acrylic teeth were tried by Neugebauer (1949). Lubit and Rappaport[28] (1949) (Fig. 3) shaped screwlike and cagelike implants. The endo-osseous implant of Svedion's acrylic teeth was performed by Laforgier (1953). A group of French authors have used acrylics widely, both alone and coupled to metallic structures.

It is recognized that every published utterance of a dental author need not be original. Furthermore, it is not expected that every dental author sit like Napoleon "grand, gloomy and peculiar—wrapped in the solitude of his own originality."[1] But it is expected—in fact professional ethics and common courtesy demand—that a writer, quoting from another, give credit for the ideas taken.

Moreover, it must be recognized that quotation marks not only give credit for borrowed words, but, where a recital of historical fact is concerned, the marks also place responsibility. Since the borrower has not read the original references, he is in no position to vouch for statements of fact. By omitting quotation marks, he makes his own ignorance appear like certain knowledge.

Sidney J. Harris, the popular newspaper columnist, commented recently that "ever since the author of the Book of Ecclesiastes complained that 'there is nothing new under the sun' writers have been plagued by the charge of literary theft." What Mr. Harris says has unquestionably been true in the past. But it must not be true in the future. If dental journalism is ever to reach the high level required by the profession, plagiarism must become as odious among authors and editors as pilfering has long since come to be in society at large.

As was stated in these editorial columns last July "no author can injure anyone by giving credit where credit is due, but he can injure himself irreparably by failing to do so."

1. Charles Phillips, the Character of Napoleon.

international correspondence

News from Great Britain

BRITISH DENTAL ASSOCIATION

The Annual Conference will be held May 25-29 in the beautiful seaside resort of Torquay in Devon. An interesting series of papers will be given and Torquay will offer a very pleasant setting for the social events. Visitors from the United States are especially welcome to these annual conferences.

Newsletter • Included in the first issue of the *British Dental Journal* for 1959 was an insert Newsletter containing items of special interest to members of the Association. This is an experiment and will be sent to members for a trial period of six months. It is intended as a serious effort on the part of the Council to give a better service of Association news to members without the necessity of giving the same information to people who are not members of the B.D.A. or even of the profession.

Industrial dental practice • The Council of the British Dental Association, aware of the increasing number of large industrial and commercial firms who are introducing their own dental schemes, has appointed a subcommittee on industrial dental practice "to advise the Council on terms and conditions in industrial dental practice and to make recommendations." The pattern of these dental schemes has varied enormously, being determined by such factors as the extent of the welfare services already provided and the size of the area from which employees were gathered.

ROYAL COLLEGE OF SURGEONS

In July the college will celebrate the centenary of the granting of the charter by which it was empowered to award a certificate of fitness to practice dentistry to persons who wished to submit themselves for examination, and to enroll those to whom the certificate was awarded as "Licentiates in Dental Surgery of the Royal College of Surgeons." The Royal College exercised its new powers at once and the first examination for the "Licence" was held in 1860.

Perhaps the most significant feature of this institution and one which still has repercussions today, was that a class of individuals came into being who were licensed to practice dental surgery by the Royal College of Surgeons but were not members of the college, or, as we would say today, were not medically qualified. In a very real sense, therefore, this moment in history marked the inauguration of a separate dental profession in Great Britain. This is why the College of Surgeons, and especially the Faculty of Dental Surgery within the College, is making very special arrangements to celebrate the occasion next July. The theme of the celebrations, which will include both scientific demonstrations and a historical exhibition, will be a record of the progress dentistry has made during the past 100 years.

In addition the first Menzies Campbell Lecture on the history of dentistry will be delivered by Professor Robert Bradlaw and there will be a symposium on the cleft palate. There will also be a well planned social program, and during the course of the meeting the Faculty will hold its annual session at which delegates from universities and schools in many parts of the world will be received.

NATIONAL HEALTH SERVICE

The report of the Ministry of Health for the year 1957, the publication of which was completed in November 1958, contains important references to dentistry.

On page 76 of the report appears the statement "the shortage of dentists is bound to become more acute before measures to increase dental manpower can bear fruit." The table accompanying this article gives the chief reason for this.

In an editorial entitled "The Future of the Dental Health Service" in the January 20th issue of the *British Dental Journal* the following passages occur:

"This table shows that 28 per cent of the dental profession within the Health Service are 60 years of age or over, and more than half of these are in the range of 65 years and over. The Minister's comment on this is that '. . . a large proportion of dentists is in the higher age groups, which makes it unlikely that the rate of entry into the profession will be able to keep pace in the immediate future with the loss through retirement and death.' "

The question which naturally arises from this is what steps can be taken by those responsible in order to meet what may well become an acute situation. The chief ones are: (1) provision for the education of an increased number of dental students; (2) an endeavor to give adequate facilities for the treatment of dental disease in children; (3) the establishment of a much larger program of research, and (4) the development of health education on a national scale. In none of these has much progress so far been made.

Of the four steps necessary to be taken it would be impossible to say which is the most urgent. The Register needs to be enlarged, the teeth of school children decay while authority dawdles, a fruitful research program could make a great contribution, and an enlightened public could practice preventive measures. Perhaps the most humane act, and the one which could give results most quickly, would be the establishment of an autonomous school dental service staffed by dentists content with their conditions of employment and, therefore, managed by an authority which recognized the need and was determined to meet it.

TWO LETTERS

One learns and reads of so many objections to and faults of the National Health Service that the following extracts from a letter written by C. A. Pitt-Steele of Norfolk to the Editor of the *British Dental Journal* may be of interest.

"I live in a mainly agricultural area and I am fully aware that a great number of my patients could not afford to pay for the treatment which I advise them to have. Even if I could live by garnering in all those patients able to pay private fees at least as large as the fees I receive from the National Health Service, I would still have it on my conscience that the great mass of people around me were not getting proper treatment.

"There is much talk of 'Clinical freedom'. Where is the clinical freedom, for instance, in knowing that the correct treatment is a porcelain jacket crown and then taking the tooth out and leaving a gap simply because that is all the patient can afford?

"Under the National Health Service I can offer the very best treatment to every patient, and it will be approved and paid for . . . so long as it is the best treatment. I have always found the Dental Estimates Board to be most reasonable. In the last eighteen months I have had only two decisions queried, and one of those was because a patient insisted on a totally unsuitable form of treatment. Indeed, in the orthodontic cases, I am often most grateful for the Board's suggestions and advice and in the matter of incorrectly filled-in forms I find them most long-suffering.

"Unlike most of your correspondents, my practice does not now boast a single private patient. Nor will it ever be so again. Yet, despite this, most of my patients seem satisfied and grateful and those whom I persuaded to have N.H.S. treatment instead of paying for it privately seem most grateful of all.

"The National Health Service is here, and it is here to stay. In direct and indirect taxation the public pays for it and is surely entitled to expect proper treatment under its auspices. That there is room for certain improvements is not in dispute, but basically and fundamentally it is a great and wonderful achievement that has saved countless people from financial worry and physical pain, and I, for one, am proud to serve it."

It is only fair to include extracts from a letter expressing a different point of view. K. V. Schute writes, in part, to the editor of the *British Dental Journal:*

"I am entirely at one with these gentlemen in their opinion that the N.H.S. is founded upon humanitarian principles and am myself 100 per cent in the N.H.S., for I dislike the possibility of any suggestion of discrimination between private and N.H.S. patients. I feel, too, that in the battle to safeguard the development of dentally healthy generations to come, not only a National Health Service is needed but far more practitioners within it, coupled with a much less autocratic and more professional administration.

"Some of the regulations administered by the Dental Estimates Board are so patently stupid and clinically insulting (for example,

the necessity for approval every time in those cases requiring scaling at shorter intervals than six months) and the fact that this body shelters its autocracy behind a secret telephone number, that I cannot understand the complacency of some of my colleagues in tolerating such conditions in silence.

"Similarly it is, to me, most galling that disciplinary action and investigation in the tribunals of the N.H.S., because there is no guarantee at all in such lay-controlled committees probably without benefit of legal training and certainly without legal assistance for the professional respondent that accepted legal procedure will obtain, lays any N.H.S. practitioner (however honest and correct he may be in his behaviour) open to the risk of being a victim of ignorance and prejudice—in secret and with little hope of redress.

"Complete freedom from major irritations, clinical interferences and vulnerability to degradations as above is, to me, a highly desirable state."

ITEMS OF INTEREST

The recently-organized London Society for the Study of Dentistry for Children has a most attractive program for this year. The members meet once a month at the Royal Society of Medicine and are to be congratulated on their energy in forming this society.

The Society for the Advancement of Anesthesia in Dentistry, the name of which is descriptive of its main interest, aims at catering especially to the dentist practicing far from the main teaching centers. Lectures are held throughout the season from which digest reports of approximately 3,000 words are prepared and circulated to the membership. Starting last October three day intensive postgraduate courses in the technic of intravenous injection have been conducted monthly. A library and an advisory service are in course of establishment.

The Royal College of Surgeons held a statutory meeting of Fellows in Dental Surgery in February which was preceded by the William Guy Memorial Lecture entitled "The Long Journey." This was most ably presented by Professor Robert Bradlaw.

Several teachers and research workers have taken appointments in the United States and Canada. H. G. Poyton has gone to the University of Toronto as professor of dental radiology and J. R. Trott has become an associate professor in periodontology at the new dental school in Winnipeg. A. C. Kerr is a research Fellow at the Forsyth Dental Infirmary in Boston and P. H. Staple has been appointed associate professor in dentistry and instructor in pharmacology at the University of Alabama at Birmingham.

An interesting original paper entitled "An investigation into the bacteriological control of infected root canals" by Pamela Hobson is published in the January 20th issue of the *British Dental Journal*.

G. H. Leatherman, D.M.D., F.D.S., R.C.S., F.A.C.D.

Table • British dentists practicing under the General Dental Services in 1957, classified by age

Age group	Number of dentists	Percentage
Under 30	1,214	12
30–34	1,406	14
35–39	1,175	11
40–44	1,095	11
45–49	833	8
50–54	750	7
55–59	849	8
60–64	1,318	13
65 and over	1,476	15
Age unknown	40	1
Total	10,156	100

News from Australia

SOUTH AUSTRALIA HOST TO WORLD DENTISTS

Against a background of Australian and United Nations flags, the Hon. D. A. Cameron, Minister of State for Health, welcomed visitors from 24 countries to Australia February 10 at the University of Adelaide. He officially opened the World Health Organization's Dental Health Seminar in the Mawson Theatre.

Addressing delegates from the Western Pacific, Southeast Asia and Eastern Mediterranean regions, Dr. Cameron said: "I can think of few things more likely to bring peoples together than this great concourse of countries meeting to discuss national problems."

Dr. Cameron said that Australians felt they had something to contribute to deliberations of this kind and were always ready to share what they had achieved in scientific and other fields, with representatives of other nations. It was the third seminar to be conducted in Australia as the result of cooperation between

the Commonwealth Government and WHO. The first, devoted to child health, was held in 1953, and the second, discussing health education and the public, two years later.

"Until a few years ago," Dr. Cameron continued, "we felt our country to be somewhat in a state of isolation, but the events of the past ten years and the alteration of our views on space, distance and travel have changed all that."

"Every country has its own problems," Dr. Cameron said. "There is no one best solution that can be applied to any particular country. Every country and every national health organization must work out its own particular scheme."

Outlining the achievements of WHO, the Public Health Administrator of the Western Pacific Region, Dr. Stephen Falkland, told the assembly: "We hope to be of ever greater assistance to the dental health of this part of the world. We aim to make it possible for all peoples to attain the highest possible standards of health. As a result of work carried out by this seminar we expect the working programs of all countries represented here to be greatly improved."

At the conclusion of the first day's program, Dr. Cameron acted as host on behalf of the Commonwealth of Australia at a reception given in honor of the delegates. Overseas participants were guests of honor at a buffet dinner given by the Australian Dental Association on February 20, to mark the end of the ten-day seminar. The president of the Association, Dr. Kenneth Adamson, was a member of the Australian delegation.

15TH AUSTRALIAN DENTAL CONGRESS

Adelaide is truly the center of interest for members of the profession in this country at the present time. The Governor of South Australia, Sir Robert George, officially opened the 15th Australian Dental Congress in Bonython Hall, University of Adelaide, Monday, February 23.

More than 600 dentists from all parts of the Commonwealth were enrolled for the five-day congress. In addition to the main lectures, the scientific program included lecturettes, table demonstrations, silent exhibits, chairside clinics, films and specialist group meetings. The team of overseas lecturers was considered to be the largest and most distinguished ever to take part in an Australian Dental Congress.

The official opening ceremony was followed by the President's Reception which was one of the highlights of the social program.

The Plenary Session was scheduled for the final afternoon of the congress. Dr. Adamson was chairman and members of the panel were the principal lecturers: Dr. Bertram H. Downs, Professor J. P. Walsh, Professor Sir Arthur Amies, Professor Jens Waerhaug, Dr. Donald J. Galagan, Dr. Edgar F. Thomson, Dr. George W. Hindels and Dr. T. Bruce Lindsay.

Margaret Hjorth

news of dentistry

Board of Trustees approves centennial promotional material, sees films

The Board of Trustees of the Association, meeting at the Central Office March 12 and 13, received the report of the Centennial Committee, and previewed and approved some of the centennial promotion and educational material including motion pictures and radio transcriptions.

The Board also voted appreciation to individuals and industries allied with dentistry that have contributed to the centennial fund.

CENTENNIAL COMMITTEE

The Special Committee on Centennial Celebration reported:

The Colgate-Palmolive Company and the Procter & Gamble Company have given grants to support presession conferences. As a result of this support, 14 dentists from abroad will receive travel grants enabling them to participate in the Centennial Session scientific program.

In addition, there will be international conferences, jointly sponsored by Fédération Dentaire Internationale commissions, Association councils and various United States agencies, on subjects ranging from education and research to military dentistry and nomenclature.

The American College of Dentists will hold a luncheon, reception and dinner honoring the Association and the Fédération Sunday, September 13. Guests of the College will include Fédération and Association officers, members of the Board of Trustees, Association staff members and international dignitaries.

An invitation has been extended to Mayor Robert Wagner to present the greetings of New York City at the opening meeting on Monday morning, September 14. An invitation also has been extended to Dr. Charles Malik, president of the United Nations, to give a brief address of welcome. Percy T. Phillips, Association president, will preside at the meeting and T. Brandrup-Wognsen will offer a brief address. The program will include a half-hour musical presentation and a roll call of nations. Simultaneous translation in English, French, German and Spanish will be used.

Dr. Leroy Burney, Surgeon General of

the U. S. Public Health Service, will be the principal speaker at the National Health Luncheon and Dr. Phillips will preside. Representatives of national health groups will be invited as guests and tickets will be sold. A $1,000 grant from H. D. Justi & Sons for support of the luncheon will be used to produce a printed souvenir program.

An evening of general entertainment, known as Centennial Night, will consist of a musical program by the Howard Barlow Orchestra at Carnegie Hall. The Association has received a grant of $3,500 from the L. D. Caulk Company as partial support for the program, and there will be only a token charge of $1 for the tickets.

The major social event for the women will be the Ladies Luncheon and Fashion Show in the Grand Ballroom of the Waldorf-Astoria Hotel. Mrs. Eisenhower has been invited to attend and has replied that she will consider the matter and reply at a later date. The price per ticket will be $6.50.

If Dr. Malik does not accept the invitation to speak at the International Health Luncheon, Prince Wan Waithayakson of Thailand, president of the United Nations in 1956, will be invited.

The Centennial Banquet will be held in the Grand Ballroom of the Waldorf-Astoria. Entertainment will include dinner music, a variety show and dancing following the dinner. The price per ticket will be $15.

The scientific program will be presented on five days at the Coliseum and on two days at the Manhattan Hotel. The latter program will use simultaneous translation. It now appears that at least 100 persons from abroad will participate in the various parts of the scientific session.

A program on hospital dental service is being arranged by the Council on Scientific Session in cooperation with the Council on Hospital Dental Service and David Tanchester of New York. The program will be presented in four New York hospitals during the Centennial Session. In addition, inquiries are being sent to the military installations in the New York area asking about tours of their dental departments for dentists attending the session. The dental schools will also offer tours and it is probable that New York University College of Dentistry will hold dedication ceremonies for its new building during the session.

Thos. Cook & Son has arranged two postsession tours designed primarily for international guests. Information on the tours is now being sent by Cook agencies to dental societies abroad. In addition there will be several tours to the Caribbean. Details on all of the tours will be carried in the preliminary program.

INTERNATIONAL PARTICIPATION

The Centennial Committee also reported that:

Travel grants have been obtained for 34 participants in the scientific session. In addition to the ten grants from the Association, there are ten from the National Institute of Dental Research, six from Procter & Gamble, and eight from the Colgate-Palmolive Company. Additionally, there is a possibility of obtaining three or four more grants through the U. S. State Department "leaders exchange program."

Mr. Henri W. Methorst of Amsterdam, Holland, will serve as chief of the team of interpreters for the simultaneous translation service. Translation in English, French and German will be provided for Fédération business meetings, and in English, French, German and Spanish for the opening meeting and general meeting, portions of the scientific session, and for the premeeting International Conferences on Research and Education. Simultaneous translation equipment will be supplied and serviced by the International Business Machines, Inc. Total cost for equipment and interpreters will be ap-

proximately $16,000. More than half of this cost will be covered by a $5,000 grant from The General Printing Company and a $3,500 grant from the Kerr Manufacturing Company.

On Thursday and Friday, September 10 and 11, there will be at least six international conferences. Already scheduled are conferences on public health, military dentistry, research, education, history, nomenclature and journalism. The conference on education will be presented Friday morning and the conference on research Friday afternoon at the Manhattan Hotel. Simultaneous translation in English, French, German and Spanish will be provided. A joint luncheon, with Dr. Byron Hollinshead as the speaker, will be included on the program. The conference on military dentistry will be presented at West Point.

STATE, LOCAL PROGRAMS

All state dental societies and at least 50 component societies, the committee reported, have named chairmen for their centennial programs during the year. Plans for specific centennial programs already have been announced by the following societies: Illinois, Maryland, Rhode Island, California, Ohio, Florida, Arkansas, Oregon, Michigan, Pennsylvania, New York and Wisconsin.

CENTENNIAL STAMP

The United States Post Office announced last November approval of the issuance of a "dental health" stamp in honor of the Association's centennial observance. After this announcement it was learned that Post Office officials were considering a stamp which would carry a dental health message but no mention of the Association or its 100th anniversary. The Post Office in recent years has become more and more reluctant to salute an organization, preferring to highlight a general area such as "freedom of the press" or "dental health." However, after discussions between staff members and Post Office officials, it has just been announced that the stamp will carry the name of the Association and the dates 1859-1959.

This is a copy of the Centennial stamp which will be issued September 14 by the U. S. Post Office. The color of the stamp, which was designed by Charles Henry Carter of Rye, N. Y., is expected to be green.

ASSOCIATION HISTORY

Production of the history of the Association has been proceeding slowly and Dr. Paul S. Lietz, head of the history department at Loyola University, has now taken over the task of revising and condensing the manuscript. The first 13 revised chapters are in the hands of the printers, R. R. Donnelly. The history should be printed and ready for distribution at the time of the Centennial Session.

FILM, TELEVISION

A variety of films for use during the centennial observance has been produced or is in production. Among these are: a four and one-half minute animated color film entitled "The Case of the Missing Tooth," produced with a $15,000 grant from the American Dental Trade Association; 20-second spot announcements for television which are now being distributed through dental societies; a 13-minute public relations film, produced

by Luxene Laboratories, Inc., and professionally distributed to television stations; a 5-minute health education film produced by the Apple Growers Association and made available to dental societies; a 25-minute public relations film, scheduled for completion in late April and produced through a $30,000 grant from Church & Dwight.

BOARD ACTIONS

In other actions, the Board appropriated $55,000 from the contingent fund largely to finance additional expenditures arising from the centennial celebration;

Authorized payment of $120,000 to the American Council on Education to support The Survey of Dentistry;

Appropriated $500 to the Health Careers Program of the National Health Council;

Appointed a Board Reference Commitee to hold hearings at the September meeting on the proposed raise in dues;

Adopted a measure to replace the use of *Robert's Rules of Order* with the *Sturgis Standard Code of Parliamentary Procedure*;

Voted to maintain the annual contingent fund at not less than 3 per cent of the total expenditure budget;

Resolved that employment agreements or contracts, except for initial contracts, shall be for one year only;

Set the dates of the next meeting of the Board of Trustees for July 21-24;

Heard a report from the Association's business manager concerning an increase in postal rates, and the statement that the Association now has 169 full-time employees;

Appropriated $600 to the special committee of the Board to develop plans for a permanent liaison with the Women's Auxiliary to the A.D.A. The committee will confer with a committee from the Auxiliary and report to the Trustees at the July meeting;

Instructed the Council on Dental Health to continue to gather as much information as possible on the development of dental care programs for dependents of uniformed services personnel, to contact constituent societies, the American Medical Association, and The American Hospital Association, and to report its findings to the Board in July. The Board also urged this Council to continue its study of dental practice and to continue to make its findings available to members through THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION;

Complimented the Council on Federal Dental Services for continued efforts to have the Air Force discontinue its four family dental clinics; and regretted that the efforts have been unsuccessful to date;

Urged this Council to continue its efforts to secure the appointment of a dental officer to the staff of the Assistant Secretary of Defense (Health and Medical);

Agreed to dispense with its usual international luncheon at the Centennial Session because of the size and complexity of the various meetings and to encourage the various specialty groups to invite international guests to their luncheons;

Approved the appointment of a committee of members of F.D.I. residing in Washington, D. C., who will assist Assistant Secretary C. Willard Camalier in entertaining international guests who will visit the nation's capital during the centennial meeting;

Approved acceptance of an invitation extended to the Association to join with other health professions in sending a "floating medical center", the USS *Consolation*, around the world. The purpose of the health teaching unit is to improve health teaching and health standards in more backward areas;

Recommended that the Council on Legislation submit two separate bills for introduction in the 86th Congress—an Army Dental Bill and an Air Force Den-

tal Bill—as the Air Force Organization Act does not identify or recognize any dental corps or corps-like unit;

It also instructed the Council on Legislation to continue its efforts to defeat the Forand Plan which provides for free hospital, nursing home and surgical services for O.A.S.I. eligibles;

Re-emphasized that the Association, through its Council on Legislation and other agencies, should increase its efforts on behalf of the Keogh-Simpson Bill;

Approved continuing efforts of the Council on Legislation to support the dental officers incentive pay plan;

Voted its appreciation to Senator James E. Murray of Montana for his efforts with regard to Senate sponsorship of a resolution commending the Association for its 100 years of service. The Board also commended Dr. Camalier for his services in this connection;

Instructed the Council on Legislation to consult with the Council on Dental Education in the development of a policy statement on the licensure of dental specialists by state legislatures;

Resolved that the Judicial Council be requested to consult with the Council on Dental Education in the development of a revision of Section 18 of the *Principles of Ethics* which relates to specialists and limitation of practice;

Appointed the following consultants to the Council on Dental Trade and Laboratory Relations: William L. Frederick, New York; Robert B. Hughlett, Tampa, Fla., and Don W. Gullett, Toronto, Canada;

Appointed Leland E. Weyer a consultant to the Council on Hospital Dental Service;

Extended heartiest congratulations to the Puerto Rico Dental Association on the issuance of its new charter;

Authorized the secretary to issue, on behalf of the officers and trustees, commemorative certificates recognizing important historic events being celebrated by dental and related organizations;

Especially suitable for awards is the plaque pictured above. It carries the bronze Centennial paperweight and a bronze nameplate on a block of walnut wood. These may be ordered by individuals for themselves or for gifts, or by constituent societies for awards for speakers and for other services. The price per plaque is $6.25 without engraving. Engraving costs are approximately 10c per letter. The plaque may be had without the nameplate for $5.75. Plaques and paperweights should be ordered directly from The Metal Arts Company, 742 Portland Ave., Rochester, N. Y.

Commended Mr. William Brede and Brede, Inc., for invaluable assistance in the presentation of the scientific program;

Expressed thanks and appreciation to the Ciba Pharmaceutical Company for its generous contribution of television equipment and technical personnel at the Centennial Session;

Approved a recommendation of the Council on Dental Research that the Association's personnel appearing before congressional appropriations committees request that the necessary funds be included in the 1960 fiscal budget of the National Institute of Dental Research for implementing such programs, such

implementation requiring no less than an additional $1,000,000 for research project grants, $300,000 for research fellowships and $200,000 for direct operations of the Institute;

Commended the Great-West Life Assurance Company for the creation of a scholarship fund through the Fund for Dental Education, Inc. The Board thanked both M. A. Gesner, Inc., and the Great-West Life Assurance Company for contributing $4,000 to cover the cost of publishing and distributing the pamphlet "Insurance Protection for the Dentist."

OFFICERS, TRUSTEES ATTENDING

Officers attending the March meeting were: Percy T. Phillips, president; Paul H. Jeserich, president-elect; P. Earle Williams, first vice-president; James E. John, second vice-president; Walter E. Dundon, third vice-president; Gerald D. Timmons, speaker; Harold Hillenbrand, secretary; C. Willard Camalier, assistant secretary; Louis M. Cruttenden, assistant secretary; H. B. Washburn, treasurer, and Lon W. Morrey, editor.

Trustees at the meeting were: Arthur W. Easton, First District; Maynard K. Hine, Seventh District; E. Jeff Justis, Sixth District; Henry M. Willits, Tenth District; Edward F. Mimmack, Second District; Fritz A. Pierson, Eleventh District; John S. Eilar, Twelfth District; John R. Abel, Thirteenth District; Howard B. Higgins, Fifth District; Raymond A. Hart, Ninth District; Charles H. Patton, Third District; Robert J. Wells, Eighth District, and Edward R. White, Fourth District.

READERSHIP SURVEYS

The Board of Trustees and officers of the Association were informed of two recent dental publication readership surveys the results of which verified the superlative position which THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION holds in the field of dental journalism. The Board was also advised that for the first time in its history, THE JOURNAL circulation had passed the 100,000 mark.

SECTION OFFICERS

The following section officers for 1960 were approved:

Anesthesiology • Leonard M. Monheim, Pittsburgh, chairman, and Harry M. Seldin, New York, vice-chairman.

Operative Dentistry • Drexell A. Boyd, Indianapolis, chairman, and John H. Mosteller, Birmingham, vice-chairman.

Oral Surgery • Daniel J. Holland, Brookline, Mass., chairman, and Gustav O. Kruger, Washington, D. C., vice-chairman.

Orthodontics and Oral Development • Francis J. Loughlin, Jamaica, N. Y., chairman, and Michael Maxian, Manhasset, N. Y., vice-chairman.

Pedodontics • Ralph E. McDonald, Indianapolis, chairman, and Norman Olsen, Chicago, vice-chairman.

Periodontics • Arnold A. Ariaudo, San Diego, chairman, and C. M. Fraleigh, San Francisco, vice-chairman.

Practice Administration • Glenn R. Brooks, Rochester, Mich., chairman, and Clarence E. Rutledge, Richmond, Calif., vice-chairman.

Complete Prosthodontics • Chastain G. Porter, Kansas City, Mo., chairman, and Philip G. Vierheller, St. Louis, vice-chairman.

Partial Prosthodontics • S. Howard Payne, Buffalo, chairman, and John F. Johnston, Indianapolis, vice-chairman.

Public Health Dentistry • Lynn L. Temple, Springfield, Mo., chairman, and John K. Peterson, Bismarck, N. D., vice-chairman.

Research • Barnet M. Levy, Houston, chairman, and Seymour J. Kreshover, Bethesda, Md., vice-chairman.

Roentgenology • Theodore S. Grant, San Francisco, chairman, and Arnold R. Neely, Portland, Ore., vice-chairman.

William Allan Logan

WILLIAM A. LOGAN BECOMES A.D.A. PUBLIC RELATIONS HEAD

On March 2, William Allan Logan became the new director of the Association's Bureau of Public Information. He was formerly an executive of the Missouri State Medical Association in St. Louis.

A graduate of the University of Kansas City, Mr. Logan was for five years a member of the editorial staff of the *Kansas City Star,* previous to his affiliation with the Missouri medical group. In the latter position he was legislative representative and also was staff editor of *Missouri Medicine,* journal of the Missouri State Medical Association.

Mr. Logan served in the U. S. Army in both the domestic and Pacific theaters, and attended the Army air corps statistical school at the Harvard School of Business Administration. He entered the air corps reserve in 1946 with the rank of captain.

PHILLIPS PICKS J. FREIDMAN FOR JAYCEE'S COMMITTEE

Association president Percy T. Phillips has appointed M. Joel Freidman of New York City, to represent the American Dental Association as a member of the United States Junior Chamber of Commerce community health advisory committee.

Expanded activity in the field of community health programs is planned through the 3,700 Jaycee communities and 200,000 members. The function of the advisory committee is to review and discuss all phases of the program now in existence or proposed for the future.

JESERICH NAMED TO ADVISORY POST IN DEFENSE DEPARTMENT

Paul Jeserich, president-elect of the Association and dean of the University of Michigan School of Dentistry, has been appointed as a representative of the Association on the Dental Advisory Committee of the Department of Defense, by Frank Berry, M.D., Assistant Secretary of the Department of Defense.

This committee works with the chiefs of the three dental services of the military departments. Dr. Jeserich also will serve as a member of the Dependents' Medical Care Advisory Committee which provides the Department of Defense with advice and assistance on matters relating to the medical care of dependents of the uniformed services in civilian medical facilities. This latter committee will meet in Washington, D. C., in May.

CENTENNIAL SESSION PROGRAM TO BE DISTRIBUTED IN APRIL

For the first time in a quarter of a century the Association will distribute a pre-

During April, members of the Linen Supply Association of America, national trade group of 1,214 linen and towel suppliers and allied firms, will give a boost to dental health. They will carry the colorful poster shown above on the sides of more than 3,200 delivery vehicles.

liminary program in advance of its annual session.

The 136-page centennial preliminary program will be sent to all members of the Association about the middle of this month. It will carry advertisements, a message from President Eisenhower, the daily programs of the Centennial Session, the complete essay program and a sampling of other parts of the scientific program.

The publication will also carry articles on the history and function of both the American Dental Association and the Fédération Dentaire Internationale, whose 47th annual session is being held jointly with the A.D.A. in New York September 14-18.

The preliminary program, of which 110,000 copies are being printed, will furnish background material on the city of New York, with listings of places to see, things to do, and advice on transportation for visitors.

"THE CASE OF THE MISSING TOOTH" CLEVER, HAS IMPACT

The animated four and one-half minute film entitled "The Case of the Missing Tooth" is a lively and graphic lesson on the importance of each tooth in the dental arch. The 16 mm. film is in color and may be rented from the Film Library of the Association by constituent societies for local viewing.

The film was made for the Association with a grant from the American Dental Trade Association. It will be distributed commercially for television showings for a period of one year, after which it will be available for general distribution.

THREE NAMED TO DENTAL ADVISORY COMMITTEE

Paul Jeserich, Ann Arbor, Mich., president-elect of the Association, has been named a representative of the A.D.A. on the Dental Advisory Committee of the Department of Defense.

Others newly named to the committee are Thomas F. Powers, Plainfield, N. J., chairman of the Council on Federal Dental Services, and Clemens V. Rault, Washington, D. C., dean of the School of Dentistry, Georgetown University.

The committee, which is headed by Thomas P. Fox, Philadelphia, also includes the chiefs of the three armed forces dental services.

In addition to his appointment to the Dental Advisory Committee, Dr. Jeserich also has been named to the Dependents' Medical Care Advisory Committee of the Defense Department.

THEATER TICKET BROKERS IN NEW YORK CITY LISTED

Individuals who plan to attend the Centennial Session in New York, September 14-18, and who wish to obtain tickets for legitimate plays in advance, may wish to write one of the following theater ticket brokers:

1. Blanche Furman Convention Theater Ticket Service, 1475 Broadway.
2. Mrs. Frances Lawlor, Leblang's Theater Tickets, Inc., 224 W. 47th St.
3. Mackey Agency, 234 W. 44th St.
4. McBride Theater Ticket Agency, 1493 Broadway.
5. Mutual Theater Ticket Company, 134 W. 48th St.
6. National Theater Ticket Service, Inc., 350 Fifth Ave.
7. Sullivan Theater Ticket Service, Inc., 207 W. 45th St.

Stamped, self-addressed envelopes should be enclosed with any orders or inquiries sent to the brokers.

TOURS PLANNED FOR EUROPEAN VISITORS TO CENTENNIAL

The European transportation committee of the Fédération Dentaire Internationale is arranging travel programs for FDI members who plan to attend the 47th annual session in New York and the Centennial Session of the American Dental Association.

Over 300 individuals have already signed up to travel in chartered planes, and five DC-7s, from different airlines, so far have been chartered. When full occupancy can be guaranteed for a chartered plane, round-trip fares can be offered at a considerable reduction.

A special tour also has been arranged for those who wish to do some sightseeing while in the United States. This will last 13 days, after the close of the Centennial Session, and will include visits to Buffalo, Niagara Falls, Detroit, Chicago, San Francisco, Monterey, Santa Barbara, Los Angeles, Hollywood, Phoenix, the Grand Canyon and back to New York.

For those wishing to attend the meetings by boat, an allotment of berths has been reserved on the SS Liberte.

D.A. SUBSCRIBERS CAN BORROW ORIGINAL ARTICLES

A subscriber to DENTAL ABSTRACTS, in whatever country he resides, has the right to borrow without charge any of the original articles abstracted in the American Dental Association's newest monthly journal.

All articles from which abstracts have been made are on file in the Association's Library. Requests for articles (up to three articles may borrowed at one time) should be addressed to the Bureau of Library and Indexing Service, American Dental Association, 222 East Superior Street, Chicago 11, Ill.

This service can bring into the reader's home the best that is thought and written on dental subjects throughout the world. The recently-completed Volume 3 of DENTAL ABSTRACTS, comprising the 12 monthly issues of 1958, contained abstracts of 938 original articles written by 1,095 authors in 42 countries. Each abstract bore the address of the author of the original article. More than 275 dental and allied publications were abstracted in DENTAL ABSTRACTS in 1958.

Subscriptions to this monthly compendium of dentistry are $8 in the United States and $9 abroad. Subscriptions may be sent to the Subscription Department, American Dental Association, 222 East Superior Street, Chicago 11, Ill.

MALIK TO SPEAK AT OPENING SESSION OF CENTENNIAL

One of the principal speakers at the opening meeting of the Centennial Session will be Dr. Charles Malik, Lebanon, president of the United Nations.

The Association and the Fédération Dentaire Internationale have invited diplomatic representatives to this joint meeting to be held the morning of Monday, September 14, in the grand ballroom of the Waldorf-Astoria Hotel.

Invitations have also been extended to representatives of dental societies all over the world and to all national and international health groups.

Simultaneous translations in French, German and Spanish will be provided for foreign visitors.

Subscript • Percy T. Phillips, Association president, has been chosen an honorary member of the Australian Dental Association.

Dental Societies

A. L. MIDGLEY, RHODE ISLAND "DENTIST OF THE CENTURY"

Born in Worcester, Mass., Albert Leonard Midgley attended Brown University and was graduated *cum laude* from Harvard University School of Dental Medicine in 1901. Since that time he has practiced his profession in Providence, R. I.

Early in his career he was one of the powerful influences in placing dental education under university ideals and auspices. He was active in discouraging

Albert Leonard Midgley, chosen "Dentist of the Century," is shown, second from right, accepting his award from William D. MacIntosh, president of the Rhode Island State Dental Society, right, and J. Stafford Allen, president-elect, left. Looking on is Senator Lister Hill (D., Ala.), one of the honor guests at the centennial awards dinner and reception held by the society in January at Providence. Percy T. Phillips, A.D.A. president, also was present.

the teaching aspirations of the dental supply houses and the itinerant vendors of dental education; always he sought to aid the dental profession to rise from its early level of vocational training to the eminence it now holds as a health service profession.

One of the founders of the American College of Dentists, Dr. Midgley was active in the creation of research fellowships and grants-in-aid, and the development of a program for the promotion of a more effective medicodental relationship, under the auspices of this body. He served as regent of the college, as contributing editor, and as its president in 1936. He also was secretary from 1922 to 1935.

Besides holding office in many state, local and national dental societies, Dr. Midgley was, for 35 successive years, a member of the Rhode Island Board of Dental Examiners.

For these and many more efforts on behalf of the dental profession, and for the other ways in which he has served his community and fellowman, Dr. Midgley was awarded the title of "Dentist of the Century" from Rhode Island at the annual meeting of the Rhode Island State Dental Society.

The meeting was held in Providence in February.

WISCONSIN STATE SOCIETY TO HEAR PHILLIPS AT MEETNG

Percy T. Phillips, president of the American Dental Association, will address the 89th annual meeting of the Wisconsin State Dental Society to be held April 27-29 at the Schroeder Hotel in Milwaukee.

A program of 14 study courses has been arranged in addition to table clinics, essays and technical motion picture films.

Among the essayists are F. E. Buebe, R. V. Brown, N. C. Carlson, C. G. Dunst, L. M. Monheim, L. D. Pankey, I. I. Secter, L. W. Swaggart and J. J. Tolan.

Further information can be obtained by writing to: Mr. Kenneth F. Crane, executive secretary, Wisconsin State Dental Society, 704 W. Wisconsin Ave., Milwaukee 3.

WASHINGTON DENTISTS WOULD APPROVE GROUP PURCHASING

A recent poll of the dentists of the state of Washington indicated approval of a plan being considered by the Washington State Dental Service Corporation for offering a dental care program on a statewide basis to groups desiring such a plan.

The W.S.D.S.C., which has been in operation for four years, presently administers three types of programs: the International Longshoremen's and Warehousemen's Union-Pacific Maritime Cor-

poration for children, a school dental accident program throughout the entire state, and the Washington Department of Public Assistance dental care program which is also statewide.

LOS ANGELES SOCIETY GIVES DENTAL SCHOOL $15,000

The applied clinical research program of the University of Southern California School of Dentistry has been enriched by a donation of $14,950 from the Los Angeles County Dental Society.

The research program is aimed at increasing the rate at which a dentist can work through the employment of high-speed drilling. In effect for two years, it already has demonstrated that a dental student can produce twice the normal amount of dental services without sacrificing quality, according to Robert W. McNulty, dean of the school.

The project is under the supervision of Rex Ingraham, professor and head of the department of operative dentistry at the university.

Public Health

GOODWILL HOSPITAL SHIP TO CARRY DENTAL PERSONNEL

Lester W. Burket, dean of the University of Pennsylvania Dental School, will head up the dental curriculum committee for Project HOPE—the privately-financed goodwill hospital ship which will be sent to Southeast Asian waters later this year, it has been announced by Dr. William B. Walsh, president of the People-to-People Health Foundation, sponsors of the project.

Serving with Dr. Burket will be Obed H. Moen, Watertown, Wis., chairman of the International Relations Committee of the American Dental Association, and Harry Lyons, Richmond, Va., former president of the Association.

"While the ship will include staff and equipment for complete medical treatment and training, an equally dramatic facility will be the up-to-the-minute dental center aboard the ship, equipped to employ all the latest technics of the dental profession," Dr. Walsh said.

The dental curriculum committee of Project HOPE—Health Opportunity for People Everywhere—will maintain liaison with the profession and with the dental colleges in this country, assist in staffing the ship, and demonstrate new teaching technics for the profession of nations visited by the ship.

NAVY ENDORSES FLUORIDATION OF CIVILIAN WATER SUPPLIES

Recommendations for fluoridation of communal civic water supplies from which U. S. Navy installations receive their water has long been the policy of the Navy.

At the present time 54 stations where children are in residence are using fluoridated water. Occasionally a Navy installation receives its water from an adjacent civilian community that does not have a fluoridation program. In such instances the Bureau of Medicine and Surgery of the Navy recommends that the commanding officer of the station provide appropriate support to efforts which may be made toward fluoridation by the civilian population.

ASSOCIATION REPRESENTED IN DRIVE AGAINST POLIO

At the request of Association president Percy T. Phillips, Harold Addelston, New York, represented the Association at a meeting called by the National Health Council to promote a campaign urging inoculation for protection against polio. Dr. Addelston is president of the American Society of Dentistry for Children.

The drive, in collaboration with the American Medical Association and the National Foundation, is also being co-

ordinated with the Advertising Council campaign to promote greater protection of the public against the disease.

P.H.S. OFFERS RADIOLOGICAL HEALTH TRAINING COURSES

The U. S. Public Health Service has announced three courses in radiological health training of particular interest to health profession personnel and x-ray technicians.

There are no tuition, book or other charges for these courses which will be offered at the Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio.

The courses are: radiological health for x-ray technicians, July 6-10 (other dates to be announced); x-ray protection, October 19-23, and medical aspects of radiological health, November 30-December 11 (other dates to be announced).

Further information and applications can be had by writing to the Center: Chief, Radiological Health Training Activities.

DECIDUOUS TEETH TO BE ANALYZED FOR STRONTIUM 90

A drive to collect 50,000 deciduous teeth from children in the St. Louis area has been launched by the Greater St. Louis Citizens' Committee for Nuclear Information (CNI), with the support of the St. Louis Dental Society and the two St. Louis dental schools. The teeth will be analyzed for their strontium 90 content.

Public interest in strontium 90 is high in St. Louis because reports have shown that milk from the St. Louis milkshed contain the highest strontium 90 level of milk from ten test areas.

Levels of strontium 90 in milk increased during September 1958 in eight of ten sampling stations across the country, the Public Health Service reported recently. All samples, however, remained well below the levels currently considered by the National Committee on Radiation Protection and Measurements to be permissible for consumption.

PENNSYLVANIA MONITORING DENTAL X-RAY MACHINES

A state-wide dental x-ray monitoring program has been started by the Industrial Hygiene Division of Pennsylvania's Health Department.

Directed by Edward R. Aston, industrial dental consultant, the program is designed primarily as a radiation protective measure for dentists and technicians operating the x-ray machines, but also to assure dental patients the maximum protection.

The program supplements the Health Department's radiation protection regulation which provides for specific procedures if a compliance order is violated.

International

R. V. BRADLAW NAMED TO NEW POST IN BRITISH INSTITUTE

The committee of management of the Institute of Dental Surgery and the board of governors of the Eastman Dental Hospital announce that Professor R. V. Bradlaw, C.B.E., D.D.Sc., D.D.S., M.D.S., F.R.C.S., F.D.S. R.C.S. (Eng.), F.D.S. R.C.S. (Edin.), dean of Sutherland Dental School, King's College, University of Durham, will succeed Dr. F. C. Wilkinson, C.B.E., M.D., D.D.Sc., M.Sc., F.R.C.S., F.D.S., as director of studies of the Institute and director of the hospital when he retires later in the year.

100TH ANNIVERSARY MEETING OF GERMAN DENTAL SOCIETY

The dental profession of Germany will celebrate the 100th anniversary of the creation of the German Society of Dentistry (Deutsche Gesellschaft für Zahn-,

Mund- und Kieferheilkunde) concurrently with the 14th "Day of Dentistry" (Deutscher Zahnärztetag). Both celebrations will take place at the new Congress Hall in Berlin, September 3-6.

Professor Ewald Harndt, the Society's chairman, and Dr. Erich Müller, president of the German Dental Association (Bundesverband der Deutschen Zahnärzte) extend to the dentists of all countries an invitation to attend the centennial meeting. The preliminary program includes scientific sessions, exhibitions of the products of dental manufacturers, social events such as banquets, fashion shows, tours and sight seeing, and is designed to make the participation in this meeting memorable for all visitors.

Dentists desiring to present a clinic or to exhibit a film should write Professor Ewald Harndt, Kurfürstenstrasse 132, Berlin, W. 30, Germany, as soon as possible. Applications to participate in the scientific sessions must include the title of the essay and a brief summary.

Requests for room reservations can be made to the meeting's secretary, R. Braun, Universitätsstrasse 73, Köln-Lindental, Germany.

OKUMURA, ORAL SURGEON AND EDUCATOR, DIES IN JAPAN

One of the world's foremost dental surgeons, Tsurukichi Okumura, died February 4 in Tokyo. Dr. Okumura was honorary dean of the Tokyo Dental College.

Born in Kanagala, Japan, in 1881, Dr. Okumura studied in the United States and was graduated from the University of Pennsylvania in 1906. He was considered the father of oral surgery in Japan and had had articles printed in many of the leading dental journals of the world, including the JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

Dr. Okumura was formerly president of the Tokyo Dental College and chairman of the executive committee of the Dental School Association of Japan.

RADIO FREE EUROPE REQUESTS AMERICANS WRITE MESSAGES

A principal feature of the 1959 Crusade for Freedom is an invitation to Americans to prepare messages for broadcast by Radio Free Europe to the captive peoples of the satellite countries.

A contest has been planned in which Americans are asked to complete the following sentence in 25 additional words or less: "As an American I support Radio Free Europe because . . ." The winner will be flown to Europe to broadcast his own message. Entrants in the contest are requested to contribute a dollar to Radio Free Europe but it is not necessary to do so to be eligible.

Messages may be mailed: Crusade for Freedom, Box 10-M, Mt. Vernon 10, N. Y.

ARMED FORCES DENTAL GROUP ORGANIZED IN OKINAWA

The Armed Forces dental officers of Okinawa have formed the Armed Forces Dental Society of Okinawa. The society is sponsored jointly by the dental officers of the Army, Navy and Air Force.

The first meeting was held January 27 at the Fort Buckner Officers' Open Mess. The clinician for this meeting was Lt. Col. John P. Christensen who spoke on prosthetic dentistry for the general practitioner.

Members of the Okinawan Dental Association were guests of the society.

EUROPEAN ORTHODONTISTS WILL MEET IN MARSEILLE

Bilingual simultaneous translation will be a part of the program of the 35th Congress of the European Orthodontic Society to be held July 6-11 in Marseille, France.

One day will be devoted to a symposium on cleft palate: surgical treatment, orthodontic treatment, prosthetic treatment and speech problems.

Among those who will take part are eminent European practitioners, dentists from the U.S.S.R. and colleagues from North America and Latin America.

Three classes of hotels will be available for registrants; reservations and travel arrangements may be made through Cook's World Tours.

Legislation

HOUSE VOTES KEOGH-SIMPSON BILL WITH LARGE MAJORITY

As THE JOURNAL went to press, word was received from Washington, D. C., that the House had passed the Keogh-Simpson Bill, H. R. 10, with an overwhelming majority vote.

The bill now goes to the Senate where its chances of passage are not as great as in the House. Dentists are urged to continue to support the bill which would permit self-employed persons to delay until age 65 payment of income taxes on up to ten per cent of their annual income if the money were placed in a retirement fund. It also would set an annual ceiling of $2,500 on such payments.

INTERNATIONAL HEALTH BILL TESTIMONY PRESENTED

Matthew Besdine, member of the Council on Legislation, George Paffenbarger, director of the American Dental Association's Research Division at the National Bureau of Standards, and C. Willard Camalier, assistant secretary of the Association, testified before the Senate Committee on Labor and Public Welfare March 4.

They spoke in favor of a proposal sponsored by Senator Hill (D., Ala.) to establish an International Institute of Health Research.

The proposal was approved in principle last November by the Association's House of Delegates.

"DENTURIST" BILLS DEFEATED IN GEORGIA, WASHINGTON

As reported briefly in THE JOURNAL last month, a "denturist" bill was defeated in Georgia, largely due to the efforts of the Georgia Dental Association. The bill would have established a "denturist board" and permitted technicians to perform prosthetic services for the public.

Similarly in Washington, a vigorous and well-planned public relations and legislative action program defeated a bill which would have permitted "denturists" to "make, alter and repair removable prosthetic denture appliances directly for the user or wearer . . . provided that any impression of the mouth and jaws in connection therewith is taken by a licensed dentist."

Similar bills now are pending in Nevada and Oklahoma.

DRAFT BILL PASSED; DENTISTS, DOCTORS RETAIN SPECIAL PAY

A bill to extend for four years the draft law, including two Senate amendments continuing the special career-incentive pay for dental and medical officers in the armed forces and U. S. Public Health Service, awaited President Eisenhower's signature after clearing the Congress in March.

The draft legislation contains the so-called doctor-draft law. The Senate Armed Services Committee added the special pay section to the bill before it was approved 90 to 1 in the Senate. The House accepted the amendments without debate.

The special pay section, a part of the Career Compensation Act, was scheduled to expire June 30. It is part of a career incentive program, advocated by the American Dental Association and put into effect in 1956, to reduce excessive turnover of professional health manpower in the military forces and make unnecessary the invoking of special draft calls for dentists and physicians.

FORAND BILL REFERRED TO HOUSE WAYS AND MEANS

The controversial bill which provides hospital, nursing home and surgical benefits, including oral surgery for O.A.S.I. eligibles, has been referred to the House Ways and Means Committee after introduction by its author, Representative Forand (D., R. I.).

Senator Humphrey (D., Minn.) has introduced a similar bill in the Senate which would limit benefits to hospital and nursing home care.

It has been reported to the Association's Council on Legislation that the lower house of the state legislature in one state has passed a resolution memorializing the U. S. Congress to enact a Forand-type measure. Constituent dental societies are urged to be on the alert for such proposals.

LAB OWNER SEEKS DAMAGES FROM DENTIST, COMMISSIONER

In his answer to a state action to enjoin him from practicing dentistry without a license, a dental laboratory owner in Council Bluffs, Iowa, has filed a cross petition asking that the state commissioner of public health and three dentists be named as defendants.

He alleges that the three dentists and the commissioner "conspired to prevent lawful shipment of supplies to him," for which he seeks $50,000 damages.

Dental Education

ILLINOIS DENTAL SCHOOL GIVEN $110,400 GRANT

The University of Illinois College of Dentistry is the recipient of a $110,400 grant from the W. K. Kellogg Foundation for a three year program aimed at improving the teaching of dentistry.

In addition to offering more effective dental teacher preparation, the program will promote needed research in education and enhance dental faculty recruitment by exposing potential dental teachers to the opportunities of teaching (and research) as a career.

A secondary purpose will be to provide continuing education for present members of the Illinois faculty and, through short courses, for teachers from other dental schools.

Pictured at the 6th annual Junior A.D.A. Day held March 4 at the University of Pennsylvania School of Dentistry are Percy T. Phillips, left, president of the American Dental Association, and Lester W. Burket, dean of the School of Dentistry.

JUNIOR A.D.A. DAY PRESENTED BY TWO PHILADELPHIA SCHOOLS

Through the combined efforts of the Temple University Dental School and the University of Pennsylvania Dental School, the 6th annual Junior A.D.A. Day was held in the University of Pennsylvania Dental School in Philadelphia March 4.

The session was opened by Percy T. Phillips, president of the American Dental Association. Henry M. Goldman, Boston, spoke on periodontics, and was followed by Henry A. Swanson, Washington, D. C.

Table clinics by selected students from

Winners of the "James McManus Memorial" dental scholarships have been announced by the Hartford (Conn.) Dental Society. Normally two $500 scholarships are awarded but this year, by unanimous vote, four scholarships were given, based on high scholastic standing, character and financial need. From left to right: Arthur Horovas, Tufts '60; Rollin Ransom, Jr., Tufts '59; Kenneth Bass, Maryland '59; Seymour Melnick, Temple '59; Sidney Rafal, president, Hartford Dental Society, and David Wallace, chairman, scholarship committee. Portrait is of James McManus, painted by his nephew, the prominent artist, James Goodwin McManus. Picture was taken by David S. Ginsburg, Hartford Dental Society, in the Hunt Memorial building owned jointly by the Hartford Dental Society and the Hartford Medical Society.

both schools were given in the afternoon session. These featured exhibitions, equipment and basic research. Also there was a closed circuit presentation on surgical procedures in periodontics.

These annual meetings of the two dental schools are always welcomed by the students as an opportunity to explore new ideas in dentistry and compare existing technics taught by the two schools.

LATE SPRING, SUMMER COURSES OFFERED BY DENTAL SCHOOLS

Baylor • The division of graduate studies, Baylor University College of Dentistry, Dallas, announces the following advanced courses of study in periodontology to begin in September:

1. A nine month course leading to the degree of bachelor of science in dentistry. This course consists approximately half of advanced study in basic science and half of clinical study.

2. A 20 month course (two regular school terms and one summer session) leading to the degree of master of science in dentistry. This consists essentially of the B.S.D. course followed by a summer term of clinical experience and then a second full nine month term of advanced study in theory and clinical practice. A thesis is required.

Further information can be had by writing to: Registrar, Baylor University College of Dentistry, 800 Hall St., Dallas 10.

California • The School of Dentistry, University of California, will present a course in clinical endodontics by Louis I. Grossman May 7-9. Further information can be obtained from Dr. Ben Pavone, director, postgraduate education, University of California Medical Center, San Francisco 22.

Illinois • The College of Dentistry at the University of Illinois will offer a postgraduate course May 21, 22 in the use of premedication in conjunction with local anesthetic agents. The course will be directed by Elaine Stuebner, department of oral and maxillofacial surgery.

A one day course in endodontics for the general practitioner will be held June 3 under the direction of Charles G. Maurice. The tuition is $25.

Applications can be obtained from the division of postgraduate education of the College of Dentistry. The address is 808 S. Wood St., Chicago 12.

Iowa • Four courses are included in a postgraduate workshop offered June 1-5 at the College of Dentistry of the State University of Iowa.

Crown and bridge prosthetics will be given under the direction of Ray V. Smith, crown and bridge department head. The course in dentistry for children will be directed by Kenneth E. Wessels, head of the department of pedodontics. Oral surgery classes will be directed by the head of the department of oral surgery, Daniel E. Waite, and Ralph C. Appleby, head of the department of prosthetic dentistry, will direct the course in that specialty.

Enrollment in each of the four areas of the workshop is limited to eight registrants. The tuition fee is $100.

Applications should be made to the College of Dentistry, State University of Iowa, Iowa City.

Massachusetts • The following courses will be given by Boston University School of Medicine, department of stomatology, at Massachusetts Memorial Hospitals:

Occlusal adjustments, April 27-May 1; endodontics, May 11-15; periodontal prosthesis, May 18-22; surgical technics employed in periodontal therapy, May 25-29; pulp protection in operative dentistry, June 4-6; periodontal pathology, June 8-12.

Details can be obtained from the director of postgraduate studies in the department of stomatology at the hospitals, 750 Harrison Ave., Boston 18.

Pittsburgh • The University of Pittsburgh School of Dentistry and the Odontological Society of Western Pennsylvania will offer a three day course in periodontal therapy starting April 30. The course will be under the direction of D. Walter Cohen. Tuition is $100 and enrollment is limited to 20.

Northwestern • The School of Dentistry of Northwestern University announces that a few places are still available in the postgraduate courses scheduled for April and May.

Orion H. Stuteville will direct a course in major oral surgery April 6-10. A course in prosthetic and orthodontic rehabilitation for the cleft palate patient will be led by Morton Rosen April 6, 7. Arne F. Romnes will lead a course on high-speed instrumentation April 15, 16, and on the same two days a course in pedodontics will be offered under the direction of Dean George W. Teuscher.

Stanley C. Harris, Ph.D., will head a faculty of four in presenting a course on the use of drugs in dental practice April 29-May 1. Diagnosis, roentgenography and treatment planning will be studied May 4, 5 under the direction of Dan Y. Burrill.

Information on tuition rates can be obtained from Dr. Eugene Skinner, Director of Postgraduate Study, Northwestern University Dental School, 311 E. Chicago Ave., Chicago 11.

Temple • Closed circuit television and high-speed equipment will be employed in two courses offered at Temple University School of Dentistry, postgraduate division.

Transographics in complete mouth restoration will be taught by Edward J. Hoffman and Elmer J. Hoffman, May 4-9. Enrollment is limited to ten and tuition is $225.

Fundamental periodontics is offered June 1-5 under the direction of Robert Gottsegan. Participants are limited to 15 and the fee is $200.

Further information can be obtained from: Temple University School of Dentistry, Postgraduate Division, Broad above Allegheny Avenue, Philadelphia 40.

Tufts • The School of Dental Medicine of Tufts University has scheduled two special postgraduate courses to follow the American Dental Association Centennial Session.

Modern concepts regarding the etiology, diagnosis and treatment of oral disease will be taught by Joseph L. Bernier September 21-23, and a participation course in periodontology will be offered September 21-25 under the direction of Irving Glickman.

On inquiry, special tuition can be arranged for dentists outside of North America. Tuition for the first course is $75 and for the second $150.

Applications can be obtained from the division of graduate and postgraduate studies of the school. The address is 136 Harrison Ave., Boston 11, Mass.

Washington • Two refresher courses are to be given by the University of Washington School

of Dentistry. A course in removable partial denture prosthesis will be directed by Walter A. Wykhuis April 30-May 2. Tuition is $60. A course in oral roentgenology for the general practitioner will be taught by F. Lloyd Jacobson and Jerome M. Zech. Tuition for this course is $65.

Applications can be obtained from the school's department of postgraduate dental education in Seattle.

NEW INTERNSHIP AVAILABLE AT CLEVELAND HOSPITAL

The Highland View Cuyahoga County Hospital, Cleveland, is accepting applications for a one year rotating dental internship to begin July 1. This is a newly-established internship.

The hospital is a fully equipped general hospital for the care of long-term illness and is affiliated with Western Reserve University Schools of Medicine and Dentistry.

Further information and applications can be obtained from Mr. Roger W. Marquand, Director, Highland View Cuyahoga County Hospital, 3901 Ireland Drive, Cleveland 22.

GRADUATE PEDODONTICS STUDY OFFERED AT OREGON SCHOOL

Applications for graduate study in pedodontics will be accepted by the University of Oregon Dental School up to May 1. This 18 month advanced program is offered to those graduates in dentistry who desire more fundamental training in pedodontics and allied medical and scientific subjects in preparation for teaching, research or pedodontic practice.

Students can complete requirements for the degree of master of science in dentistry.

Application forms and information regarding the program can be obtained from: Dr. D. R. Porter, department of pedodontics, University of Oregon Dental School, 611 S.W. Campus Dr., Portland 1, Ore.

TEMPLE DENTAL SCHOOL PLANS ALUMNI DAY PROGRAM MAY 6

Four postgraduate courses will be given from 9 to 11:30 A.M., Wednesday, May 6, which is Alumni Day at the Temple University School of Dentistry. They are on prosthetics, restorative dentistry, orthodontics and surgery and oral medicine.

After round-table discussion luncheons a memorial plaque will be dedicated and Jay Eshleman will speak on "A Philosophy of Dental Practice."

At the 95th annual reunion dinner, Temple alumni will honor the university's president, Robert L. Johnson, for his accomplishments for the school. The dinner will be held at the Drake Hotel.

TUFTS OFFERS TWO GRADUATE COURSES IN ORAL SURGERY

Two graduate courses in oral surgery have been announced by the Tufts University School of Dental Medicine. The first is a three year training program in conjunction with the Boston City Hospital. The first year is spent at the school and consists of study in basic and applied sciences. The second and third years are spent as intern and resident at the hospital. For these latter two years there is no tuition and participants receive a stipend from the hospital.

The second course is a one year basic science course in oral surgery. The opportunity for clinical work in oral surgery is not included in the curriculum of this course.

Further information can be obtained from: Division of Graduate and Postgraduate Studies, Tufts University School of Dental Medicine, 136 Harrison Ave., Boston 11.

Subscript • The department of dental materials at the School of Dentistry of Georgetown University is celebrating its silver anniversary during the 1958-59 session.

The American Society of Oral Surgeons last month established its central headquarters in offices in the new American Hospital Association building in Chicago. Present at the first executive council session of the society in the new offices were (from left to right, seated) Mr. Duke Trexler, executive secretary; Frank H. O'Halloran, vice-president; Frederick A. Henny, president-elect; Frederick Pfeiffer, president; Edward C. Thompson, secretary; (standing) Lyall O. Bishop, Daniel F. Lynch, John McQuade, Jack H. Beckwith, W. Talbot Foster and A. B. Corwell.

General

CONTRACTS AWARDED FOR NEW DENTAL RESEARCH BUILDING

The contract for the construction of the building at Bethesda, Md., to house the National Institute of Dental Research, was awarded March 9. The contract went to the Norair Engineering Corporation. Its bid was for $2,298,000 which covers construction of the basic structure and excludes the movable partitions, laboratory and special equipment.

Bids for elevators have been received and the contract will be awarded to the Murphy Elevator Company for $72,798.

"Ground breaking" for the long-awaited new edifice will be held late in April or early in May.

PAST-PRESIDENT FITZGERALD PRESENTED MEMORIAL AWARD

Leslie M. FitzGerald of Dubuque, Iowa, past president of the American Dental Association, has been presented the Arnold K. Meislen Memorial Award for the year 1958.

Dr. FitzGerald is secretary of the American Board of Oral Surgery and a past president of the American Society of Oral Surgeons.

This award is given annually by New York University for a major contribution to oral surgery, in memory of Arnold K. Meislen, M.D., D.D.S.

SEMINAR ON DENTISTRY FOR CHRONICALLY ILL SCHEDULED

A tuition-free postgraduate certificate course on the dental prosthetic rehabilitation of patients with chronic diseases and disabilities will be conducted this spring for 50 selected participants by New York University's College of Dentistry.

The one week course, which runs from

Monday, May 18, through Friday, May 24, will be concerned with theories, diagnosis and treatment. It is believed to be the first course of its kind in the United States.

According to Dean Raymond J. Nagle, the seminar is intended for dentists, physicians, allied medical administrative personnel and professional social workers. A daily stipend of $12 plus travel allowance will be provided. Applicants must be citizens of the United States or must have declared their intention of becoming citizens.

The program is supported by a grant from the Office of Vocational Rehabilitation of the Department of Health, Education, and Welfare.

Sidney I. Silverman is in charge of the seminar.

N.U. HOMECOMING TO FEATURE NOYES MEMORIAL LECTURE

The second annual Edmund Noyes Memorial Lecture will be a highlight of the annual Homecoming of Northwestern University Dental School alumni which will be held May 6 at the school.

Harry Lyons, dean of the Medical College of Virginia School of Dentistry, and past president of the American Dental Association, will deliver the address in the afternoon after a luncheon. The forenoon will be devoted to clinics.

Alumni will also have an opportunity to inspect results of the extensive modernization program which has recently been completed at the school.

LOUISVILLE UNIVERSITY GETS GRANT FOR RESEARCH LABS

One of the 45 U. S. Public Health Service grants to help build and equip additional health research facilities in 40 institutions is for $64,500. This sum has been approved for the purpose of building dental research laboratories at the University of Louisville, Louisville, Ky.

The grants are the final awards under the appropriation for the fiscal year ending June 30. They also mark the completion of the initial three year 90-million-dollar construction program authorized by the 84th Congress in July 1956.

According to the announcement from the office of Surgeon General Leroy E. Burney, the grants are made to both public and nonprofit hospitals, dental and medical schools, schools of public health, and other research institutions, and are awarded on a matching basis.

WEST COAST ORAL PATHOLOGY WORKSHOP TO BE HELD IN MAY

The first annual session of the Pacific Coast Oral Pathology Workshop will be held May 3, the day preceding the Southern California State Dental Association meeting in Los Angeles.

The workshop has arisen from a desire by oral pathologists and others interested in the field to have an annual scientific program on the Pacific Coast similar to the annual meetings of the American Academy of Oral Pathology. It has been decided that the workshops from now on will be held in conjunction with other state meetings. The 1960 workshop will be planned for the Oregon State meeting in Portland.

HENRY FIXOTT, PIONEER IN ORAL ROENTGENOLOGY, DIES

Henry Cline Fixott, Sr., 80, died February 25, at his home in Portland, Ore. He attended the old North Pacific Dental College, now the University of Oregon Dental School, and received his D.M.D. degree in 1906. He was in general practice in Portland until 1917, when he began specializing in the diagnosis of dental diseases. As a result of his pioneering and postgraduate studies, Dr. Fixott was made a Fellow in the American College of Dentists.

He was a member of the American

Dental Association and delegate to the House of Delegates in 1922 and 1936. Dr. Fixott also was past president of the American College of Dentists, a member of the Oregon State Dental Association and the Portland District Dental Society, and the first president of the American Academy of Oral Roentgenology.

Dr. Fixott is survived by three sons, two of them dentists and one a physician and surgeon.

PLAN INTERNATIONAL MEETING ON DENTAL PUBLIC HEALTH

An International Conference on Dental Public Health has been planned in conjunction with the Centennial Session of the American Dental Association in New York this fall.

The one day event will be held September 12 under the sponsorship of the Public Dental Health Services Commission of the Fédération Dentaire Internationale, the American Association of Public Health Dentists and the A.D.A. Council on Dental Health.

Representing the sponsoring organizations on the planning committee are Carl Sebelius, Nashville, state dental director for Tennessee and A.A.P.H.D. program chairman, who is serving as general chairman; John W. Knutson, Washington, D. C., chief dental officer of the Public Health Service, and vice-chairman of the F.D.I. commission, and Rudolph R. Friedrich, Chicago, secretary of the A.D.A. Council.

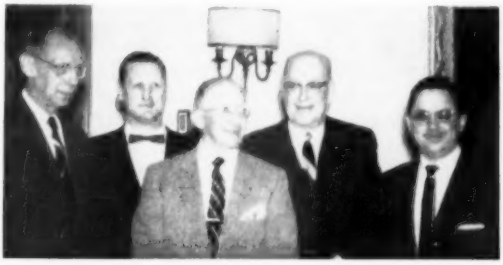
NORTHWEST ACADEMY TO MEET MAY 24-28 AT SUN VALLEY

The 15th annual conference of the Northwest Academy of Dental Medicine will be held at the Challenger Inn, Sun Valley, Idaho, beginning with a dinner meeting on Sunday May 24 and ending with a luncheon May 28.

The speakers will be John B. Macdonald, D.D.S., M.S., Ph.D., director of Forsyth Dental Infirmary for Children, Boston, and professor of oral microbiology, Harvard School of Dental Medicine; Claes Lundqvist, L.D.S. (Swed.), D.D.S. (U.S.A.), M.D. (Swed.), private practitioner and consultant at the University Hospital in Lund, Sweden; Thomas F. Dougherty, Ph.D., director of the radiology laboratory, University of Utah College of Medicine, and a leading figure in the field of cancer research, and his wife, Jean H. Dougherty, M.D., University of Utah College of Medicine, member of the research staff in radiobiology and of the departments of pathology and hematology.

NAVY LIEUTENANT COMMENDED FOR AID TO ORPHANAGE

The Surgeon General, Rear Admiral B. W. Hogan, USN, recently awarded a letter of commendation to Lt. Ethan C. Allen, DC, USN, for ". . . outstanding work in providing dental care to alleviate pain for the approximately 200 children in the Casa Materna Orphanage while



William R. Alstadt, immediate past president of the Association, was the recipient recently of an "Alumni Citation" from Washington University for his distinguished career in the dental profession. Shown, left to right, are: Leroy Boling, dean, School of Dentistry, Washington University; Dr. Alstadt; Frank Foerster, professor emeritus of clinical dental prosthetics, who also was given an award; Ethan A. H. Shepley, chancellor of the university, and J. Paul Guidry, chairman, Alumni Federation.

attached to the U. S. Navy Support Activity, Naples, Italy, from July 1957 to January 1959."

The letter continued "... You unselfishly and with no thought of recompense or recognition devoted much of your off duty time to this humanitarian work. This willingness to give of your professional skill to needy children who are unable to obtain care from other sources is in the highest tradition of the health professions and reflects credit on our Navy and on our country."

GALAGAN ATTENDS SEMINAR IN AUSTRALIA AS W.H.O. DELEGATE

D. J. Galagan, dentist with the U. S. Public Health Service, attended a World Health Organization Dental Health Seminar in Adelaide, Australia, in February. Dr. Galagan was one of two WHO consultants who attended the meeting. The other was Jens Waerhaug of Norway.

Dr. Galagan read two papers at the WHO seminar, and after its close attended the Australian Dental Congress where he presented another paper entitled "The Nature of the Fluoridation Controversy in the U. S."

BUREAU OF STANDARDS ATTRACTS FOREIGN VISITORS

Visitors from widely separated parts of the world have been registered recently at the National Bureau of Standards in Washington, D. C. Research in dental materials has been the object of their interest in most cases.

Among the foreign guests have been: Euchi Masuhara, professor of dentistry, Tokyo Medical and Dental University, Tokyo; T. N. Chawla, chief of the College of Dentistry, Lucknow University, Lucknow, India; Gunnar Stjunstrom, Arbogas, Sweden; Mikio Shirasu, Osaka Dental College, Osaka, Japan; Paul A. Mashino, Osaka Dental College, Osaka, Japan, and Yachia Yagin from the same school.

Also, Richard Earnshaw, Turner Dental School, Manchester, England; Carl H. Fisher, Göttingen, Germany; Ernesto Arias, School of Dentistry, Guatemala, and K. L. Shourie, Bombay, India.

BERKSHIRE CONFERENCE ON ORAL PATHOLOGY JUNE 14-18

The Tenth Annual Berkshire Conference in Oral Pathology and Periodontology at Eastover in Lenox, Mass., will be conducted June 14-18 by the division of graduate and postgraduate studies of Tufts University School of Dental Medicine. The conference will consist of four days of lectures, seminars and panel discussions regarding the clinical problems by outstanding teachers and clinicians in dentistry, medicine and related fields.

The central theme will be "Trauma and Oral Disease." Among the lecturers will be Joseph L. Bernier, Armed Forces Institute of Pathology, Washington, D. C.; Basil G. Bibby, Eastman Dental Dispensary, Rochester, N. Y.; Milton B. Engel, College of Dentistry, University of Illinois, Chicago; Irving Glickman, Tufts University School of Dental Medicine, Boston; Balint J. Orban, Loyola University School of Dentistry, Chicago; Sigurd P. Ramfjord, School of Dentistry, University of Michigan, Ann Arbor, and Louis Weinstein, M.D., Tufts University School of Medicine, Boston.

The curriculum is arranged so that the mornings and evenings are devoted to professional activities, with afternoons open for recreation. This is a conference for general practitioners as well as those interested in a specialized practice.

SYMPOSIUM ON BONE PLANNED BY SCHOOL AND SOCIETY

The Indiana University School of Dentistry and the Indiana Cancer Society will present a symposium on bone—dis-

eases of the maxilla and mandible—at 9:15 A.M. Wednesday, April 15, in the Indiana State Board of Health building, Indianapolis.

Dean Maynard K. Hine will open the program and other speakers will be S. Miles Standish, Charles A. Waldron, William G. Shafer, David F. Mitchell and Richard W. Tiecke.

There is no charge for the program and all those interested in the subject are urged to attend.

SCHOPPER HONORED AS "MAN OF THE YEAR" BY ALUMNI

Arthur F. Schopper, Kansas City, was named "Man of the Year" by the Alumni Association of the University of Kansas City's School of Dentistry.

Dr. Schopper has just completed six years as a member of the Board of Trustees of the American Dental Association. In 1948, he helped organize the first postwar conference of the American Dental Society of Europe at London.

ACADEMY OF RESTORATIVE DENTISTRY ELECTS OFFICERS

The new officers of the American Academy of Restorative Dentistry are:

President, Allison G. James, Beverly Hills, Calif.; president-elect, Carlisle C. Bastian, New York City, and secretary-treasurer, Morton H. Mortonson, Jr., Milwaukee.

The next annual meeting of the group will be held in Chicago, February 6, 7, 1960.

PERCENTAGES OF WOMEN WHO PRACTICE DENTISTRY VARY

The United States has the lowest percentage of women who are practicing dentists of any of the Occidental countries, according to statistics published in the December issue of *SSO*, Zurich, bulletin of the Swiss Dental Association. Percentages of women dentists are given as follows:

Finland	80
Denmark	41
Sweden	26
Norway	24
France	22
West Germany	13
Belgium	10
Switzerland	9.5
England	7
Austria	4
United States	3

Accurate figures from the Soviet Union and satellite nations are not available. Members of the dental profession who have visited Russia estimate that the percentage may be as high as 70.

In the opinion of the article's author, women dentists have proved to be especially suited for pedodontic practice and school dental service.

OHIO STATE U. ANNOUNCES POST COLLEGE ASSEMBLY

The Ohio State University College of Dentistry, Columbus, has announced that the 15th annual Post College Assembly will be held April 15-16. Sessions and programs will be held in the Ohio Union and the College of Dentistry.

Arthur S. Flemming, Secretary of Health, Education, and Welfare, will be the principal speaker at the dinner session.

DENTAL MEDICINE MEETING SCHEDULED FOR MAY 14-17

The role of oral medicine in the practice of dentistry will be the theme of the 13th annual meeting of the American Academy of Dental Medicine. The sessions will be held May 14-17 at the Hotel Claridge, Atlantic City. Reuben Feltman, Passaic, N. J., is general chairman.

Among those scheduled to lead discussion are Emanuel Cheraskin, Lester R. Cahn, S. Sigmund Stahl, Harry Blachman and Austin H. Kutscher.

A program of social events and sightseeing has been arranged for registrants and their families.

All academy members as well as other interested dentists and physicians are cordially invited to attend. Programs and reservations can be had by writing to: Dr. Harold A. Lentz, 619 Main Ave., Passaic, N. J.

ST. LOUIS DENTAL SCHOOL INVITES WOMEN STUDENTS

The St. Louis University School of Dentistry has opened its doors to women for the first time in its 56-year history and will begin accepting applications for admission to the September 1959 class, it has been announced by Stephen P. Forrest, dean.

The admission has been approved by the university's board of trustees to encourage more women to enter the field of dentistry.

Women students for some time have attended the university's College of Arts and Sciences for predental studies and now will be able to continue their education at St. Louis University by entering the School of Dentistry and working toward a Doctor of Dental Surgery degree.

MINNESOTA DENTIST DONATES $50,000 TO HOME FOR AGED

A veteran Hutchinson, Minn., dentist, Jay H. Burns, has made a $50,000 contribution for the establishment of a home for the aged in Hutchinson.

Given in memory of his parents, the gift consists of the deed to the 200-acre Burns family farm. Proceeds from the eventual sale of the farm, valued at $50,000, will go toward financing the proposed home.

Dr. Burns, a native of Oakfield, Wis., has practiced dentistry in Hutchinson since 1903.

ORAL REHABILITATION STUDY GROUP TO MEET IN CHICAGO

At the first of a series of meetings of the Midwest Oral Rehabilitation Study Group, Charles E. Stuart of Ventura, Calif., will present a three day course in functional occlusion and diagnosis.

This course, under the direction of one of the country's leading clinicians, will be held April 9-11 at Northwestern University, School of Dentistry.

Further information can be obtained from Dr. Milton J. Sondell, 2011 E. 75th St., Chicago 49.

Also • B. Nygaard-Östby, director of the Norway Institute of Dental Research, recently lectured on endodontics to the staff, postgraduate students and guests of the U. S. Naval Dental School, National Naval Medical Center, Bethesda, Md. . . . F. D. Ostrander, Ann Arbor, Mich., will represent the Association at the opening of the new Food and Drug Administration Detroit District Headquarters May 14 and attend the banquet to be held that evening in the Sheraton-Cadillac Hotel. . . . Frank H. Foerster, professor emeritus of clinical dental prosthetics, was among six long-time members of the Washington University faculty who were honored at Founders' Day ceremonies February 22 at Graham Memorial Chapel on the campus at St. Louis. . . . Gordon Agnew, University of California Medical Center, San Francisco, will represent the Fédération Dentaire Internationale at the annual meeting of the Philippine Dental Association May 13-17 at Manila. . . . Edgar D. Coolidge, professor emeritus of dental therapeutics at Loyola University's School of Dentistry, was awarded the Illinois Interprofessional Council's distinguished service award of 1958-59.

reports of councils and bureaus

Cabinet official challenges fluoridation opponents

BUREAU OF PUBLIC INFORMATION

The water fluoridation program has moved ahead in terms of the number of communities served by the procedure. At the end of 1958, nearly 35 million persons in almost 1,800 cities and towns, including many of the major cities of the country, were included in the program. Nevertheless, fluoridation still remains a source for militant and voluble opposition in some parts of the country, particularly in smaller communities. The following statement by Arthur S. Flemming, Secretary of Health, Education and Welfare, which was issued at a press conference on February 9, 1959, takes issue vigorously with the program's failure to be placed in operation in every fluoride-deficient community in the country and represents what is probably the most forthright public statement on the subject from any high-ranking government official to date. Reprints of the statement are available on request to the Association's Bureau of Public Information, 222 E. Superior St., Chicago 11.

Surgeon General Leroy E. Burney has called my attention to a very significant set-back in the progress of the fluoridation program during the last two years.

Although controlled fluoridation has been proved over and over again to be an inexpensive and completely safe means of preventing 65 per cent of dental decay, only one out of every four people in this country today has this protection.

Moreover—and this is the most disturbing fact of all—the proportion of the population not benefiting from this remarkable health measure is actually increasing.

This is a particularly appropriate time to call attention to the decline in progress of the fluoridation program in view of the fact that this week has been proclaimed by President Eisenhower as National Children's Dental Health Week.

Why every community with a public water supply has not availed itself of the proved dental health benefits of controlled fluoridation is difficult for me to understand in the light of the following facts:

1. Intensive research over a quarter of a century shows conclusively that water contain-

ing a proper amount of fluoride reduces dental decay by about 65 per cent.

2. Equally conclusive research has demonstrated that controlled fluoridation is completely safe, causing no bodily harm of any kind.

3. The American Dental Association, the American Medical Association and virtually all other scientific and professional organizations having competence in the field have recommended the fluoridation of public water supplies.

4. This protection costs only a few cents per person per year. If started in childhood, the protection is effective over a lifetime.

5. Controlled fluoridation does not mean adding a foreign substance to water; all water contains some fluoride. Fluoridation of water as a public health measure simply means controlling the amount of fluoride in a public water supply.

6. Even water containing as much as eight times the amount of fluoride recommended for prevention of tooth decay does not injure a person's health. Too much fluoride in water does cause discoloration of tooth enamel but has never been known to injure health.

7. Public opinion polls reveal that the majority of people who are informed about fluoridation are favorably disposed to the idea.

I have inquired into why, in the light of all these factors, the extension of fluoridation has been lagging in the last two years.

I have come to the conclusion that it amounts basically to this: the opponents of fluoridation are a militant minority; the proponents of fluoridation, as is so frequently the case with proponents of new health measures, are an unmilitant majority.

In my review of the situation with Dr. Burney and his associates in the Public Health Service, it seems to me that what is needed is a militant majority for fluoridation.

I am convinced that fluoridation would be proceeding rapidly if the question were decided on its merits by informed people.

Some informed people will, of course, continue to oppose fluoridation as a matter of principle. I respect their views even though I cannot, on the basis of the scientific evidence, concur in their conclusions.

But such persons are not, by and large, the ones who succeed in blocking local fluoridation projects.

For example, some of the most vocal opponents of fluoridation are persons who have been charged by the Food and Drug Administration with making false health claims for nostrums and devices and thereby influencing their customers against seeking needed medical service.

Dr. George F. Lull, then secretary and general manager of the American Medical Association, in an editorial in *Today's Health*, June 1955, used these words to describe the opposition to fluoridation:

"In addition to the sincere opposition which merits respect, there is the usual hue and cry from those who take every opportunity to discredit medical science and legitimate public health progress. We will find in the antifluoridation camp the anti-vaccinationists, the anti-vivisectionists, the cults and quacks of all descriptions; in short, everyone who has a grudge against legitimate scientific progress. They bring all manner of irresponsible charges, including the allegation that fluoridation is promoted for commercial profit by those who manufacture the chemicals and machinery and that irresponsible scientists and public officials have been 'bought.' The ridiculousness of such a charge evaporates into thin air when one merely looks at the official and professional bodies that have endorsed fluoridation."

As Dr. Lull implies, the kind of opposition to fluoridation which we are now experiencing is by no means new in the public health field. Indeed, this opposition is very similar to that which arose in the early days of such invaluable health measures as chlorination of public water supplies, pasteurization of milk, and vaccination. Owing in large part to such opposition, it has taken 50 years, for example, to get widespread acceptance of chlorination. I hope that urban communities which have not yet fluoridated their water supply will not be denied this important health benefit for a comparable period.

It is nothing short of tragic to deny millions of children the benefits—now and in their later years—of healthy teeth, particularly when, in addition to the scientific evidence that points to the efficacy of fluoridation, public opinion polls indicate a majority of citizens desire to take advantage of this established health measure.

Yet this is clearly what is happening in a number of communities large and small. For example, a poll by Elmo Roper and Associates in 1957 showed that 57 per cent of the people in cities of 1,000,000 and over said fluoridation was a good idea, while only 20 per cent said it was not a good idea. In communities of 100,000 to 1,000,000 the response was 50 per cent for, 19 per cent opposed, while in communities of 2,500 to 100,000 it was 54 per cent for and 24 per cent against.

As long ago as 1953, when fluoridation was still relatively new and before the opposition

became fully organized, a poll by Dr. George Gallup showed that people who knew about fluoridation favored its adoption as a community health measure by a margin of nearly 4 to 1.

In his proclamation on National Children's Dental Health Week, President Eisenhower has urged all agencies and organizations interested in the health and welfare of children to call to the attention of the people of the United States the fundamental necessity for a continuous program for the protection and development of the dental health of the Nation's children.

Certainly, the most effective means of promoting dental health is to stop tooth decay before it starts among millions of the Nation's children. This can be accomplished through fluoridation of community public water supplies.

Hospital internship and residency accreditation program

COUNCIL ON DENTAL EDUCATION

One of the several functions of the Council on Dental Education is that of evaluating advanced dental education programs in hospitals in accordance with the requirements originally approved by the House of Delegates in 1946 and subsequently amended. The Council has now accredited 306 internship and residency programs (see table) in 213 hospitals, which offer more than 600 positions annually for dental graduates who are interested in preparing for practice in one of the recognized dental specialties or who elect to obtain additional training and experience for general practice. During the past five years the number of hospitals offering approved dental training programs and the number of internships and residencies approved by the Council have almost doubled. In view of the increasing demand for advanced dental education, it is anticipated that the number of hospital training programs will continue to increase substantially in the next few years.

There are currently 6,818 hospitals in the United States of which about 2,300 have dental departments. About 300 hospitals have dental education programs and of these, as already stated, 213 have one or more programs that are accredited.

The Council on Dental Education defines a dental internship as a form of professional education beyond the undergraduate level which offers special opportunity for advanced clinical experience and additional training in the sciences basic for dental practice. Three types of internships are recognized:

1. The Rotating Internship covers all of the major areas of dental practice. These areas can be taught in an integrated fashion or in sequence, with each area included separately.

2. The Mixed Internship covers two or more areas but not all of the major fields of dental practice; that is, oral surgery, periodontics, and pedodontics.

3. The Straight Internship covers one major area of dental practice with its closely associated fields; that is, oral surgery supported by oral pathology, anesthesiology, roentgenology, and anatomy.

A dental residency is defined by the

Council as a progressive and graduated educational experience, under hospital auspices, designed for the dental graduate who has completed an approved dental internship or at least one year of graduate training in the basic sciences, or a suitable equivalent. The residency should offer opportunity for developing proficiency in a specialized field of dental practice or research and should provide the educational background for continued development in a special field. Straight residencies are currently accredited in the fields of oral surgery, oral pathology, pedodontics, periodontics, and prosthodontics.

Applications for approval of dental internships and residencies which are received by the Council are referred to its Committee on Internships and Residencies for preliminary review. If the program meets the basic requirements, arrangements are made for a formal inspection by one of the Council's field representatives and a member of the hospital dental service committee of the dental society of the state in which the hospital is located. The visiting committee reports its findings to the Council's Committee on Internships and Residencies which makes recommendations regarding approval of the program to the Council. Announcements of the Council's accreditation action are published periodically in THE JOURNAL.

The Council has worked closely with the members of the various certifying boards in the dental specialties, education committees of the academies and societies, and the dental schools in developing details of advanced programs so that curriculums and course content may be suggested to the hospitals and also to the dental schools which offer basic science courses for the intern or resident. The Council has been delegated the responsibility for reviewing and accrediting graduate and postgraduate programs, but thus far has not developed the requirements or the standards for such programs. At the present time, the various specialty boards recognize the advanced study that is given in hospitals whose internships and residencies are approved by the Council and, normally, the boards also recognize the graduate or postgraduate programs offered by accredited dental schools.

Included in the table are several hospital training programs recently approved by the Council, as well as the internships and residencies offered by 58 federal hospitals of the Air Force, Army, Navy, Public Health Service, and the Veterans Administration.

In accordance with the Council's policy of promoting increasingly higher standards for all education programs in dentistry, the approved internships and residencies are revaluated periodically. During the review, as in the original evaluation, emphasis is placed on program content, availability of clinical teaching material, and adequacy of the hospital dental teaching staff.

A list of dental internships and residency programs approved by the Council may be obtained by writing to the Council on Dental Education, American Dental Association, 222 E. Superior St., Chicago 11. Also available is the brochure, *Dental Programs for Hospitals,* in which the Council's requirements for the approval of dental internships and residencies are stated.

Table • Summary data on dental internships and residencies approved by the Council on Dental Education

Type of program	No. approved
Rotating internship	95
Mixed internship	7
Oral surgery internship	74
Pedodontics internship	9
Total internship	185
Oral pathology residency	2
Oral surgery residency	89
Pedodontics residency	4
Periodontics residency	8
Prosthodontics residency	18
Total residencies	121

The Florida dental laboratory registration law

Robert B. Hughlett, D.D.S., Tampa, Fla.*

COUNCIL ON DENTAL TRADE AND LABORATORY RELATIONS

For the last 12 or 14 years there has existed a continually increasing problem in the State of Florida; the violation of the Dental Practice Act. A large majority of these violations are of two distinct types. The first type of violation is the failure on the part of the dentist and the dental laboratory owner to follow closely the requirements for dental prosthetic prescriptions. The dentist was slow to develop the habit of submitting adequate and correct prescriptions that would positively identify a given piece of dental prosthesis. The laboratory owner was reluctant to require a proper prescription as he felt he might jeopardize his position with the dentist sending him the work; consequently, many laboratory owners made no attempt to keep a file on prescriptions, as required in the statute, and actually discouraged the use of prescriptions as much as they could. They also worked out many devious methods of setting up files of prescriptions that might pass a cursory inspection to avoid suspicion of their own activities.

The second major type of violation was the illegal practice of dentistry by the many members of the laboratory industry who were engaged in taking in denture repairs and remakes directly from the public, the taking of impressions of the mouth for construction of removable partial dentures and complete dentures, and in some instances they have also engaged in the extraction of teeth, the placement of crowns on teeth, as well as other acts constituting the practice of dentistry.

The Board of Dental Examiners, in cooperation with the Florida State Dental Society, has recently worked out and put into effect an excellent program for the control of this first type of violation. The result of this effort is quite gratifying and it is believed that this phase of the problem will soon be brought under control. However, illegal practice, the second type of violation, has continued to flourish in spite of the best efforts of the Board and the dental profession in the State of Florida.

Prior to the last 12 or 14 years, the pattern of investigation and prosecution of these violators was of a sporadic nature. When a violator became quite flagrant and well known, the Board of Dental Examiners would investigate, secure necessary evidence and prosecute the case. In some cases, private professional investigators were employed and in almost all instances, private legal counsel was needed to make any progress in the courts at all. The outcome of most of these cases was simply that they were found guilty, a small fine was levied, which amounted to about 5 per cent of the sum spent by the Board for the investigation and the prosecution, and then they were turned free to go back to work again.

The only effective method of control of illegal practice at that time, was the employment of the injunction procedure to restrain the violator from illegal practice of dentistry by court order. Then it was necessary to build a second complete airtight case, to employ legal coun-

sel again, bring the case before the court again and to prove a second violation to have him found guilty of contempt. If the judge so chose at this time, he could send the violator to jail, impose a heavier fine on him or force him to leave the state. This process was the only effective procedure to be found and it was impractical from the standpoint of the time and the expense involved and could only be used in the most flagrant cases for obvious reasons. Consequently, the violations continued to increase on every hand until it became necessary to try to have a more concerted and continuous effort to bring the problem under a measure of control.

The Florida Dental Society went into the legislature and had their annual registration fees raised to provide the State Board with more funds with which to prosecute these cases. The State Board was thus enabled to step up their investigation and prosecution to some extent, but it was not long before it became apparent that this small increase in the effort was insufficient.

About 12 years ago illegal practice committees were set up in the State Dental Society, as well as in the five districts in the state; dues were increased to provide funds for a more concerted program. Each of the district committees employed legal counsel, professional investigators, and brought many cases to prosecution. For several years there was a pretty well sustained effort, at least in the more populated areas of the state, to investigate cases of illegal practice and secure injunctions against the operators, sometimes bringing criminal proceedings and then trying to secure additional evidence of continuing illegal practice so that they might be brought back before the court and be given a jail sentence. Several of these cases were completed with gratifying results. Illegal practice of dentistry was slowed down somewhat, but at what a price! There was a tremendous expenditure of time as well as money. The State Board depleted its funds, the district societies were practically bankrupt and were unwilling to continue the very substantial expenditures of money. The men who had given so much of their time in the big effort could not be replaced with men of equal zeal. Therefore, as the prosecution activity decreased, the illegal practice began gradually to increase again. Also, as some pressure was brought to bear on illegal operators in Georgia or Alabama or New York or Illinois, they would open up in Florida the next week.

Most dentists are familiar with the basic problem. In Florida our problem is unique as we are also bothered continually by seasonal violators. Typical of this type is the man who operates a laboratory in the North, who equips his house trailer as a laboratory and over the weekend sets up an illegal practice of dentistry in a trailer camp in Florida—or the man who comes in with a couple of suitcases, rents a store front or a garage, solicits the patronage of one or two marginal dentists as a front and engages in illegal practice. The control of this type of illegal practice cannot be achieved by the methods previously outlined as the necessary detection, investigation and the securing of evidence seldom can be completed before the operator has moved to another location. In the experiences gained in the prosecution of these cases, it has been found advantageous in many cases to invoke the assistance of other law enforcement agencies. In some cases, we have been able to use the local occupational license bureaus and their enforcement officers to close up or to discourage some operators. The immigration authorities have been called upon in some cases of aliens; the Internal Revenue Service is sometimes interested in the evidence of the volume of work done by these operators and when applicable, these efforts are a great deterrent to the continuing operation of the illegal operator or practitioner.

Although the Florida Dental Practice Act had been considered a good law, it finally became crystal clear that it could be improved in several ways, not only to provide for more deterrents to violators, but also to put more teeth into the law to provide a change in the nature of the crime from a misdemeanor to a felony for the illegal practice of dentistry and to impose heavier penalties for those convicted. It also became crystal clear that there would have to be a much closer cooperative effort by the Board of Dental Examiners, the dental profession, and the laboratory industry. As the problem of control of illegal practice was considered by the Florida State Board and their advisory committee, it became apparent that a much greater effort would have to be made in the discouragement of the beginning of illegal practice, rather than its prosecution after it had sprung up and grown to lucrative maturity. The situation as it actually existed and the possible remedies were analyzed in this manner:

1. Most of the offenders, or potential offenders, were members of the dental laboratory industry.

2. These men were just as great a problem in their trade as they were to the dental profession.

3. Through a cooperative effort of the dental profession and the laboratory industry, violators could be identified much quicker and could be brought immediately under close scrutiny and regular inspection.

4. The establishment of a system of deterrents to make the illegal practice of dentistry too costly, either by jeopardizing their future employment in the trade or by loss of or suspension of their occupational license for operating a laboratory could be a strong deterrent to the first offense.

5. By establishing a method of inspection by a representative of the Board to ascertain that the laboratory was operated properly under the statute could strengthen the whole industry as all would be required to operate legitimately.

6. By giving police powers to the representative of the Board to gain entry, to impound evidence of illegal practice, and to make arrests, the potential violator would know the authority vested in the investigator and would be more reluctant to risk detection by trying his luck at illegal practice.

7. By registration of laboratories the previous steps would be greatly facilitated and further deterrents could be worked out. It would be advantageous to know who and where laboratories are, who owns them, the number of employees they have, the type of work they do, as well as a record of their previous charges and convictions of violations.

With this analysis of the problem and its possible solution in mind, the Board and their advisory committee began an exhaustive study of methods whereby such a program might be instituted. A complete study was made of the parallel program in Florida for the illegal medical practice and narcotics control. Conferences were held with the Florida State Health Officer, his administrative assistants, and particularly with the Chief of the Narcotics Bureau of the State Board of Health. The Chief of the Narcotics Bureau has had the greatest experience in our state in the investigation and prosecution of illegal medical practices, narcotics violations, and violation on the part of drugstores in regard to issuing of drugs and narcotics without prescriptions. The Board of Dental Examiners were studying the possibility of turning the problem of policing the dental laboratories and prosecution of illegal practice over to the Narcotics Bureau and their experienced staff of investigators. In the process of this study, the bureau chief gave the board an outline of the manner in which the Dental Practice Act would have to be changed to make the policing, detection, and prosecution of dental cases practical.

His first and most positive recommendation was that to gain control of the situation that exists in the State of Florida, the dental laboratories would have to be registered, he would have to secure certain basic information under oath as to ownership, location, employees, previous convictions, and so on, in order to start an effective program.

Several of the very talented attorneys that had been retained by the Board had recommended previously that a basic registration requirement would have been very effective in some of these cases from the prosecution standpoint, and all of them have stressed the fact that registration would be an effective deterrent to violation as well as to the infiltration of drifters, price cutters, and other undesirables.

In February of 1957, after all of the preliminary studies of this problem had been completed, a joint meeting of the Board, the advisory committee to the Board, and the Executive Council of the Florida State Dental Society was held, in which all the various possible methods of procedure were considered and approved or disapproved. As a result of this meeting, it was decided that a dynamic effort would be made to put into effect a well-rounded five point plan to attempt to produce maximum control of violations of the dental law.

The first point of this plan was to engage the fullest possible cooperation of the members of the Florida Laboratory Guild, members of the Florida State Dental Society and the Board of Dental Examiners in a concerted, continuous effort to stamp out violations.

The second point of this plan was the decision to go into the legislature seeking amendments to the dental law to give more authority to the agents of the Board, provide for a change in the nature of the crime from a misdemeanor to a felony and to provide for heavier penalties, as well as some other improvements in the law.

The third point was to enact a basic registration law for dental laboratories. This decision was predicated upon the condition that the Laboratory Guild members would be willing to lend their support and cooperation in the effort to control violation, and would recognize the advantages to the laboratory industry of registration.

The registration of dental laboratories was to be done on the basis of registering a business entity, not a registration of persons or technicians as individuals. Registration was not to be based on any grades or degrees of skill. The registration law was to be enacted for the purpose of requiring a listing of the business entities with the State Board of Dental Examiners, under the dental law, as an aid to the enforcement of the law.

It was the decision of this joint meeting that if the laboratory owners, through their Guild, would not agree to lend their support to this over-all plan, the registration legislation would not be introduced. We sought for complete unanimity of opinion on this proposal before going to the legislature and were gratified to receive the approval and endorsement of registration before we ever had a preliminary draft of the bill to present to the Florida Laboratory Guild.

The fourth point of this program was for the Board of Dental Examiners to adopt rules and regulations for the mechanics of registration designed to secure the basic information needed and to provide for as many deterrents for violations as could be worked out.

The fifth point was to engage in a continuous close inspection program of the laboratories to forestall the beginning of violations and to secure evidence in the case of violators to bring about prosecution.

After the adoption of this over-all plan, it was presented to the officers of the Florida Laboratory Guild and received their approval. In March of 1957, it was presented to the general membership of

the Guild at their state meeting after which they endorsed the procedure outlined. The necessary bills were drafted and introduced in the 1957 legislature and were passed without any opposition and with only very minor changes to suit the introducers and supporters of the bills. It is anticipated that the experience with the present registration law will suggest some amendments to make it more effective as time goes on. The Board of Dental Examiners feels that it is too early to evaluate the effectiveness of the registration law, but the short experience to date indicates that registration may prove to be more effective than was anticipated. The actual sections of the statute providing for registration are made a part of this paper, in the reproduction of the State Board form entitled "Important Notice to all Owners and or Operators of Dental Laboratories in the State of Florida" (see Exhibit A). The registration law is composed of Chapter 466, Sections 50-58, Florida Statutes and in general provides as follows:

Section 51 defines the dental laboratory and in the original draft provided for the exception of the full-time employee of the legally, registered, licensed dentist who did take in work from other dentists. In changing the wording slightly in one of the final drafts of the bill, the exception phrase was inadvertently left out. This has caused some misunderstanding as under the definition of the dental laboratory, it would appear that the full-time dental technician employed in the dental office was required to register. This is not the intent of the law.

Section 52 is the requirement for registration annually and within 30 days of change of ownership or address of the laboratory in conformity with rules and regulations promulgated by the Board. The annual registration fee is $6.00. It was the opinion of the Florida Laboratory Guild that ethical, legally-operated laboratories would be willing to pay a registration fee to help defray the cost of registration and the expenses of the inspection and prosecution program.

Section 53 provides that the Board of Dental Examiners shall not require examination, but shall issue registration certificate upon completion of the registration form and compliance with any rules promulgated by the Board under Sections 50 to 58. (The "1958 Annual Certificate of Registration" issued by the Florida State Board of Dental Examiners is shown in Exhibit B.)

Section 54 provides for the periodic inspections of the laboratory.

Section 55 provides for the suspension or revocation of the certificate after notice and hearing for failure to comply with Sections 50 to 58, or for any violation of Chapter 466.

Section 56 gives the Board the authority to promulgate rules necessary for the enforcement of these sections and to carry out the purposes of these sections.

Section 57 makes it unlawful for any person, firm, or corporation to operate as a dental laboratory, as defined, except those registered as provided in Sections 50 to 58.

Section 58 sets forth the penalties for violation of these particular sections.

The Board has adopted certain rules and regulations as to dates of registration and as to information required on the application form which is a part of this paper (see Exhibit C). It requires little comment except to call attention to the requirement for information pertinent to the detection and control of violators as well as information as to the scope of services rendered, technicians employed, and so on. This information is all secured under oath.

In the opinion of the Board there are certain advantages gained by laboratory registration:

First, failure to register as a laboratory in itself is a violation of the statute. Therefore, many of the illegal operators that have been devious enough to prevent the investigator from securing satis-

IMPORTANT NOTICE

To all Owners and or Operators of Dental Laboratories in the State of Florida:

Chapter 466.50-58, Florida Statutes, as amended by the 1957 Legislature read as follows:

466.50 Objects and purposes.—The purpose of §§466.50-466.58 is to safeguard the public health by requiring that only qualified dental laboratories be permitted to operate in this state.

History.—Comp. §1, ch. 57-242.

466.51 Dental laboratory defined.—The term dental laboratory as used in §§466.50-466.58 shall be deemed to include any person, firm or corporation who:

(1) Performs for a fee of any kind, gratuitously or otherwise, directly or through an agent or employee by any means or method, or who in any way supplies or manufactures artificial substitutes for the natural teeth, or who furnishes, supplies, constructs or reproduces or repairs any prosthetic denture, bridge or appliance to be worn in the human mouth or who in any way holds itself out as a dental laboratory.

History.—Comp. §2, ch. 57-242.

466.52 Registration.—Any person, firm or corporation operating under §§466.50-466.58 shall be required to register with the board of dental examiners annually and also within thirty days of change of ownership or address of any dental laboratory, in conformity with rules and regulations promulgated by the board, and shall pay a registration fee in the amount of six dollars.

History.—Comp. §4, ch. 57-242.

466.53 Board of dental examiners.—The board of dental examiners shall not require an examination, but shall issue a registration certificate upon completion of the registration form and compliance with any rules promulgated by the board under §§466.50-466.58.

History.—Comp. §5, ch. 57-242.

466.54 Periodic inspections required.—The board may require from the applicant any information necessary to carry out the purpose of §§466.50-466.58 and may require periodic inspection of all laboratories registered by virtue of §§466.50-466.58.

History.—Comp. §6, ch. 57-242.

466.55—Suspension and revocation.—The board may suspend or revoke the certificate of any laboratory registered under §§466.50-466.58 after notice and hearing for failure to comply with §§466.50-466.58 or for any violation of chapter 466.

History.—Comp. §7, ch. 57-242.

466.56 Rules.—The board may promulgate all rules necessary for the enforcement of §§466.50-466.58 and to carry out the purposes of §§466.50-466.58.

History.—Comp. §8, ch. 57-242.

466.57—Violations.—It shall be unlawful for any person, firm or corporation to operate as a dental laboratory as defined, except those registered as provided in §§466.50-466.58.

History.—Comp. §3, ch. 57-242.

466.58 Penalties.—Violation of any provision of §§466.50-466.58 shall constitute a misdemeanor for which any person on conviction shall be punished by a fine of not more than $1000 or by imprisonment in the county jail for not more than 12 months, or by both such fine and imprisonment, in the discretion of the court.

History.—Comp. §9, ch. 57-242.

An application and a self-addressed envelope are enclosed for your use in complying with this section of the Florida Statutes. Please furnish all information requested and forward the application with your check or money order in the amount of six dollars made payable to the Florida State Board of Dental Examiners.

This registration applies only to owners and operators of laboratories.

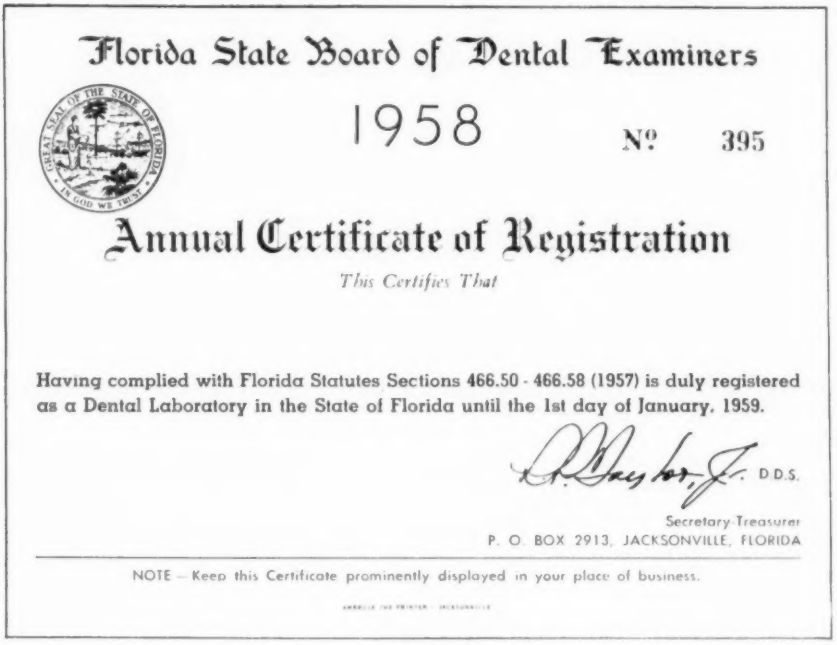
The registration application and fee are due January 1st and are delinquent April 1st.

Your cooperation is appreciated.

FLORIDA STATE BOARD OF DENTAL EXAMINERS
R. P. Taylor, Jr., D.D.S.
Secretary Treasurer
P. O. Box 2913
Jacksonville, Fla.

encls.

Exhibit A



Florida State Board of Dental Examiners

1958 No. 395

Annual Certificate of Registration

This Certifies That

Having complied with Florida Statutes Sections 466.50 - 466.58 (1957) is duly registered as a Dental Laboratory in the State of Florida until the 1st day of January, 1959.

D.D.S.

Secretary-Treasurer
P. O. BOX 2913, JACKSONVILLE, FLORIDA

NOTE — Keep this Certificate prominently displayed in your place of business.

Exhibit B

factory evidence will be in violation of the statutes simply by not registering and may be prosecuted without the expense of investigation.

Second, certain basic information as to ownership and operation of the laboratories is secured that cannot be obtained otherwise without a careful and expensive investigation and the responsibility for any possible infraction is placed more properly. When an owner of a laboratory fills out the registration form, he then knows that he is the responsible party as he has to make an affidavit as to the truth of the information supplied.

Third, certain basic information as to the charges and convictions of the laboratory operator is secured and set up in the central files so that chronic offenders can be recognized and watched carefully.

Fourth, basic information as to the laboratory manpower situation is made available which will be of great interest to the profession as well as to the laboratory industry.

Fifth, the required registration and completion of the registration form will deter many of our seasonal migratory laboratory operators as they will be in violation if they do not register and will be under close scrutiny if they do register. The seasonal violator, the drifter, invades Florida to engage in illegal practice, and can be brought under better control by the registration law and the rules being formulated to implement registration.

One of the biggest advantages noted in the limited experience with the laboratory registration is the awakened consciousness on the part of the laboratory industry to the necessity of operating their laboratories according to the statute.

APPLICATION FOR DENTAL LABORATORY REGISTRATION

with

Florida State Board of Dental Examiners

(Florida Statutes Sec. 466.50-466.58)

LEAVE THIS SPACE BLANK

Reg. No. _____

NOTE: This application for registration is to be filed on or after January 1, and prior to March 30 each year.

Date _____

Name of Laboratory _____

Business Address _____ City _____ State _____

Business Address _____ City _____ State _____

Year business established _____ by _____

(Original owner)

Is the business a corporation? _____ Partnership? _____ Sole proprietorship? _____

If partnership or sole proprietorship and business is operated under a fictitious name, where is such name registered?

County _____ Book _____, Page _____

Owners or stockholders _____

Name of Individual Filing This Application _____

Copy of text on signs visible to public:

Inside: _____

Outside: _____

Member of: _____

(List laboratory or technical organizations)

Accredited by Prosthetic Service Committee of Florida State Dental Society? Yes _____ No _____

Has any owner, partner, officer, director, stockholder or employee ever been a party to any civil, criminal or administrative proceeding involving any violation of any statute, rule or regulation governing the practice of any profession or the regulation of narcotics or other drugs? Yes _____ No _____ If yes, give details on back of application

Has any owner, partner, officer, director, stockholder or employee ever been convicted of any offense involving moral turpitude? Yes _____ No _____ If yes, list details on back of application

Number of personnel: Technicians _____ Clerical _____ Service _____ Total _____

Exhibit C, page 1

List technicians:

Name	Age	Number of years experience

(Use opposite page if additional space is needed)

Equipment and Fixtures: Is your equipment modern and does it meet requirements for reasonable lighting, sanitation, safety and fire protection?

Do you have necessary equipment to carry out technics you perform?

Indicate technics performed in your laboratory: Franchise?

Denture

Casting

(a) Inlay, crown and bridge

(b) Partial, (chrome or gold)

Ceramics

Other

Are your technicians trained by sponsors of technics or recognized clinicians in any of above technics? Yes No

If "yes" list the technics

Signed

(Specify owner, partner or officer)

List two reputable licensed practicing dentists as references:

Exhibit C, page 2

STATE OF FLORIDA,

COUNTY OF_____

I CERTIFY that I am _____ of the Dental Laboratory for registration
(Specify owner, partner, officer)

of which this application is submitted, and that the information contained in this application is correct.

Sworn to and subscribed before me

this_____ day of _____, 19____

Notary Public State of Florida at Large

My commission expires:

Exhibit C, page 3

A very few years ago the general attitude held by most laboratory men was that they could make anything they pleased for anyone they pleased. For the most part, the legitimate laboratory owner is quick to recognize the advantages of running a legal and ethical business, and is not only anxious to maintain his own establishment according to the statute, but is also willing to help point out the violators and chiselers in his ranks.

In conclusion, the Florida Board of Dental Examiners would like to stress the fact that they do not consider laboratory registration to be a panacea. Registration only has a value as a part of a very well-balanced active plan, and would, probably, only be applicable in dealing with a problem similar to the situation that has existed in Florida for several years. It is believed that it will prove to be very beneficial in this state. It is sincerely hoped that the work done and the experience to be gained will be beneficial to the dental profession and the laboratory industry in other sections of the country.

Presented before the symposium on programs affecting relations between the dental profession and the dental laboratory group, American Dental Association, Chicago, September 29-30, 1958.

*Representative of the Florida State Board of Dental Examiners.

Wanted: color slides

AMERICAN DENTAL ASSOCIATION FILM LIBRARY
BUREAU OF LIBRARY AND INDEXING SERVICE

Description • Original Kodachrome, Ektachrome or Ansco color 2 by 2 transparencies; exposure-good; focus-sharp; detail preferred; age not important.

Subject Matter • You've got it; we need it—see below.

Purpose • Service to the dental profession. A central source of reference slides and slide-lecture presentations of dental-technical information is needed for study and presentation, research and education.

The Film Library maintains a collection of 2 by 2 slides on subjects of interest to dentists in general practice or in specialty fields. Some of the slides are useful in case presentation, patient education, and dental health education for the public. A particular need for the 2 by 2 slides is felt in foreign countries where economic and language barriers limit the use of the motion picture.

Slides are maintained in sets or series and are loaned in series only by the Film Library. Where permission has been granted by the author, individual slides from a series may be purchased at cost from the Order Department of the Association.

Slides are usually acquired as a series from an individual or an institution that has developed visual material which is felt to be of value to the profession. The original color slides are loaned to the Association for the preparation of a duplicating master. The originals are returned to the owner within a month. No payment is made to the owner for the use of his slides, but author credit is given in the film catalogue and on the guide that accompanies the slides. Supplementary material including books, pamphlets, reprints, speech notes, bibliographies, and so on, are sent out with the slides.

Two distinct types of slide series are maintained; (1) the first is the reference series (for example, "Atlas of the Mouth," "Dental Pathology," "Atlas of Oral and Facial Lesions," and so on). The reference series covers a wide range of material from which the dentist may select specific slides for presentation or purchase. These slides are accompanied by a guide which identifies each slide. (2) The second is the packaged presentation series (for example, "X-rays and Your Teeth," "The Little Pigs," "Fluoridation," "American Dental Association," "Treatment of Cross-bite," "Periodontia," and so on). These slides are accompanied by a recording, speech notes or lecture guide for a packaged presentation. Individual slide guides are available free.

If you have developed or can develop a slide series from your own collection and would be willing to have it distributed by the American Dental Association as outlined, please write to the Film Library, Bureau of Library and Indexing Service, American Dental Association, 222 E. Superior St., Chicago.

Slide selection, slide identification and the development of speech notes are the function of the author. Suggestions for revision may be given. Acceptance for distribution will be governed by demand for the subject matter, organization of the presentation and quality of the photography.

Special Request: Before and After Cases • Because of popular request, the Film Library is trying to develop a reference series of "Before and After Cases" in all phases of orthodontics, prosthodontics, periodontics and oral surgery. Demonstrations of improvements in esthetics or function are sought primarily. Roentgenographic comparisons will be considered. In some instances, a third slide may be included to show an out-of-the-mouth view of the appliance or prosthesis. Two or 200 of your slides may be suitable for this collection. A brief author's comment on each case is necessary for the preparation of a guide.

Council announces classification of additional products

COUNCIL ON DENTAL THERAPEUTICS

The classification of products by the Council on Dental Therapeutics has been described in a previous report (J.A.D.A. 40:489 April 1950). The Council's program now provides for classification of products in Group A, Group B, Group C and Group D. Products are reconsidered periodically, and decisions are subject to change at any time that a substantial amount of new evidence becomes available. The files of the Council contain information on many drugs and dental cosmetics and inquiries are welcome.

GROUP A

Listing of products in Group A means that at the time of their consideration, the items conformed with the provisions for acceptance established by the Council on Dental Therapeutics and adopted by the Board of Trustees and the House of Delegates of the American Dental Association. Items in this group will be listed in *Accepted Dental Remedies*, and may use the Seal of Acceptance, unless otherwise provided.

The following additional products are classified in Group A:

Eugenol, U.S.P. (See A.D.R. 1959, p. 108)

Eugenol, U.S.P. (Garfinkel's Dental Supply Co.): A brand of eugenol, U.S.P.

Benzalkonium Chloride, U.S.P. (See A.D.R. 1959, p. 91).

Cetyl Dimethyl Ethyl Ammonium Bromide (See A.D.R. 1959, p. 92)

Getz Germicide Concentrate (The William Getz Corporation): Each 100 ml. is stated to contain benzalkonium chloride, 7 Gm.; cetyl dimethyl ethyl ammonium bromide, 7 Gm.; sodium nitrite, 8 Gm.; isopropyl alcohol, 2.67 Gm.; color and water.

Zinc Oxide-Eugenol Preparations (See A.D.R. 1959, p. 165)

Periodontal Pack Powder and Liquid (Professional Products Company): Powder: Each 100 Gm. is stated to contain zinc oxide, 42.9 Gm.; powdered rosin, 38.1 Gm.; tannic acid, 9.5 Gm.; kaolin, 2.4 Gm., and asbestos, shredded, 7.1 Gm. Liquid: Each 100 ml. is stated to contain eugenol, 98 ml.; thymol, 2 Gm., and color.

GROUP B

Listing of products in Group B means that there is insufficient evidence to justify their present acceptance, but there is reasonable evidence of their usefulness and safety. These products meet the other qualifications and standards established by the Council on Dental Therapeutics. It is the Council's opinion that Group B products may be promoted for special use and study.

The Council's initial consideration of products which may be eligible for Group B listing is influenced favorably by the knowledge of further investigations then in progress. It is the policy of the Council to reconsider Group B products each year on the basis of new evidence which may be produced in their support. Classification in this category is not ordinarily continued for more than three years.

GROUP C

Listing of products in Group C means that the evidence is so limited or inconclusive that the products cannot be accurately evaluated. It is the Council's opinion that Group C products require further study by qualified investigators.

GROUP D

Listing of products in Group D means that they are unacceptable because of their demonstrated inability to meet the standards outlined in the provisions for acceptance.

Sound hazard of high speed cutting instruments

COUNCIL ON DENTAL RESEARCH

One of the characteristics of certain of the high speed dental instruments is the sound produced. Aside from any irritational quality it may have, it is known to extend beyond 80 decibels in the 4,000 to 8,000 cps (cycles per second) range.

Investigations are under way to determine if sufficient exposure to the operator occurs in dental practice to affect his auditory mechanism. Data, as of now, are incomplete in this regard; however, it is hoped that sufficient information will be available soon so as to permit accurate analysis.

Those using high speed instruments routinely in dental practice would do well to have an audiogram taken periodically which will serve to record any variations in hearing acuity that may have occurred.

Survey of former Armed Forces dental officers

BUREAU OF ECONOMIC RESEARCH AND STATISTICS

This is the third survey of discharged dental officers. The first two surveys included dentists who had been discharged between January 1950 and August 1955.[1] This survey includes dentists who were released between September 1955 and October 1957.

The first two surveys were undertaken primarily to obtain information that would help in solving the problem of staffing the Armed Forces dental corps. In this survey, more emphasis was given to questions pertaining to dental care provided to dependents of Armed Forces servicemen. In all three surveys, one of the purposes has been to obtain information on the efficiency of the military dental establishments. The Council on Federal Dental Services is charged with evaluating the efficiency of dentistry in the Armed Forces.

Of the 4,032 questionnaires sent out in this survey, 2,437, or 60 per cent, were returned. Included in the tabulations in this report are returns from 918 Army dentists, 508 Navy dentists and 919 Air Force dentists.

The dentists who had served in the Navy and Air Force were considerably younger than those who had served in the Army. The percentage distribution of respondents by age is shown in Table 1. The mean age of former Army dentists was 34.5, compared to 31.3 for the Navy and 31.5 for the Air Force. The distribution according to year of graduation is shown in Table 2.

The differences in age of respondents by branch of service are reflected in Table 3, which shows that only 43.0 per cent of the Army dentists went directly from dental school into service, compared to 59.1 per cent of Air Force dentists and 66.0 per cent of Navy dentists. About half of the Army dentists had been in private practice, compared to less than one third of Navy dentists and slightly over one third of Air Force dentists.

The proportion of Army dentists (43.8 per cent) commissioned after being called for induction under Public Law 779 was about twice as high as the proportion of Navy dentists (18.9 per cent) or Air Force dentists (23.2 per cent). The proportion of dentists volunteering during their senior year or commissioned under the senior dental student program was lower for Army dentists than for either Navy or Air Force dentists (Table 4).

The percentage of respondents who had served exactly 24 months who had been promoted was 86.0 per cent in the Air Force, 83.1 per cent in the Navy and 64.8 per cent in the Army. However, the highest average rank at both entry into and release from military service was held by Army dentists; Navy dentists held the lowest average rank at both entry and release (Table 5).

Respondents were asked, "Were you ever eligible for a promotion which was delayed or never given?" An affirmative answer was given by 13.6 per cent of Army dentists, 13.7 per cent of Navy dentists and 8.1 per cent of Air Force dentists. Those who answered "yes" to the foregoing question were further asked "Was the reason for the delay well founded?", to which an affirmative answer was given by 13.1 per cent of the

Table 1 • Percentage distribution of respondents by age

Age	Army	Navy	Air Force
25–29	35.2	48.9	52.7
30–34	28.6	34.8	28.6
35–39	10.2	10.0	6.3
40–44	10.0	2.2	5.9
45–49	13.4	2.6	6.3
50–54	1.3	.9	.2
55 and over	1.3	.6	.0
Total	100.0	100.0	100.0

Table 2 • Percentage distribution of respondents by year of graduation

Year of graduation	Army	Navy	Air Force
1953–1957	56.3	77.1	76.4
1948–1952	13.2	8.5	8.9
1943–1947	10.1	9.8	6.3
1938–1942	8.2	1.4	4.7
1933–1937	9.7	2.2	3.6
1928–1932	1.2	.4	.1
Before 1928	1.3	.6	.0
Total	100.0	100.0	100.0

Table 3 • Percentage distribution of respondents by status immediately preceding military service

Status	Army	Navy	Air Force
General practitioner	46.4	25.4	31.0
Specialist	3.8	3.4	3.8
Intern or resident	3.1	1.5	3.1
Dental student	43.0	66.0	59.1
Teacher	3.4	3.5	2.5
Other	.3	.2	.5
Total	100.0	100.0	100.0

Table 4 • Percentage distribution of respondents by method of receiving commission

Method	Army	Navy	Air Force
Commissioned after graduation as a result of volunteering during senior year	39.5	49.9	58.8
Commissioned under senior dental student program	3.7	9.7	6.9
Commissioned after call for induction under Public Law 779	43.8	18.9	23.2
Commissioned as a result of volunteering after graduation	6.3	5.5	6.9
Commissioned under dental internship program	1.1	.8	.9
Commissioned under Navy Ensign 1995 Program	.0	12.2	.0
Reappointed from line reserve commission	4.3	1.8	2.7
Other	1.3	1.2	.6
Total	100.0	100.0	100.0

Table 5 • Percentage distribution of dental officers serving exactly 24 months, by rank at time of entry into and rank at time of release from military service

Rank at entry		Rank at release	Army	Navy	Air Force
O-2	(1st Lt., Lt. (j.g.)	O-2	9.5	9.0	.5
O-2		O-3	56.6	74.7	83.3
O-3	(Capt., Lt.)	O-3	10.6	6.8	6.3
O-3		O-4	3.3	5.3	1.3
O-3		O-5	.0	1.1	.0
O-4	(Maj., Lt. Comdr.)	O-4	11.1	.8	4.8
O-4		O-5	4.9	2.0	1.4
O-5	(Lt. Col., Comdr.)	O-5	4.0	.3	2.4
Total			100.0	100.0	100.0

Table 6 • Percentage distribution of respondents holding reserve commissions according to rank in the reserve

Rank	Army	Navy	Air Force
1st Lt., Lt. (j.g.)	19.3	7.4	46.9
Capt., Lt.	69.2	87.1	48.1
Maj., Lt. Comdr.	3.8	1.6	1.5
Lt. Col., Comdr.	5.4	.5	1.7
Col., Capt.	.6	.8	.0
Brig. Gen.	.2	.0	.0
Undesignated	1.5	2.6	1.8
Total	100.0	100.0	100.0

Army dentists, 16.7 per cent of the Navy dentists and 8.8 per cent of the Air Force dentists.

Among the respondents the following percentages reported holding reserve commissions: Army, 52.2 per cent; Navy, 75.1 per cent; Air Force, 65.8 per cent. The vast majority of Navy reservists (87.1 per cent) held rank O-3 (lieutenant); in the other two branches there was greater dispersion of reserve ranks (Table 6).

Former dental officers were asked, "Were your assignments generally in line with your dental training and experience?" A "yes" answer to this question was received from 88.8 per cent of Army dentists, 92.5 per cent of Navy dentists and 95.3 per cent of Air Force dentists. A related question was, "If you were performing general dentistry, were you given the opportunity to practice in the full scope of general dentistry?" "Yes" was the reply of 49.7 per cent of Army dentists, 35.1 per cent of Navy dentists and 63.9 per cent of Air Force dentists. Table 7 shows that most of the remarks in connection with this question were to the effect that practice was limited to fillings or operative dentistry.

In response to the question, "Do you feel that your period of active duty was an educational experience that improved your ability as a dentist?" 69.2 per cent of the Army dentists answered "yes," compared to 78.9 per cent of the Navy dentists and 82.2 per cent of the Air

Table 7 • Percentage of respondents commenting as indicated in connection with the question: "If you were performing general dentistry, were you given the opportunity to practice in the full scope of general dentistry?"

Comment	Army	Navy	Air Force
Amalgam line—fillings only—restorative work only—operative work only	13.6	17.5	8.2
No (or too little) prosthetic work	5.1	15.4	4.5
No (or too little) crown and bridgework	2.4	1.2	3.0
No (or too little) oral surgery	1.0	.4	.4

Force dentists. The comments regarding this question did not vary greatly among the three branches. About 5 per cent mentioned that educational value was limited to particular types of dentistry; about 3 per cent mentioned the experience of learning from fellow dental officers and about 3 per cent remarked that the only educational value was in gaining speed or confidence as a dentist.

An affirmative answer was given to the question, "Was any formal dental educational program made available to you by your branch of service?" by 30.6 per cent of Army dentists, 40.3 per cent of Navy dentists and 22.1 per cent of Air Force dentists. The comment that educational programs were available only to career officers was made by 4.2 per cent of Army dentists, 6.9 per cent of Navy dentists and 9.1 per cent of Air Force dentists.

Respondents were asked, "Were you allowed time off to attend scientific meetings and postgraduate courses sponsored by dental societies?" "Yes" was the reply of 68.6 per cent of Army dentists, 76.6 per cent of Navy dentists and 60.7 per cent of Air Force dentists.

Table 8 • Percentage distribution of respondents according to opinion regarding length, quality and content of basic training received

	Army	Navy	Air Force
Length			
About right	59.7	68.9	71.5
Too long	29.4	6.1	21.0
Too short	7.8	21.4	6.5
No opinion	3.1	3.6	1.0
Total	100.0	100.0	100.0
Quality			
Excellent	13.6	6.4	9.2
Good	37.6	39.2	41.2
Fair	31.1	30.9	35.9
Poor	14.0	19.5	11.0
No opinion	3.7	4.0	2.7
Total	100.0	100.0	100.0
Content			
Entirely appropriate	17.7	25.0	18.3
Partially appropriate	68.5	60.8	72.6
Completely inappropriate	9.5	10.4	6.6
No opinion	4.3	3.8	2.5
Total	100.0	100.0	100.0

Table 9 • Mean number of months of service as a dental officer, in the continental United States and overseas

Location	Army	Navy	Air Force
In the United States	18.6	22.6	18.9
Overseas	8.1	6.4	6.2
Total	26.7	29.0	25.1

The opinion of respondents with regard to length, quality and content of basic training received is shown in Table 8. A majority of the respondents from each branch considered the length of basic training period "about right." A considerably larger proportion of dentists from the Navy than of dentists from the other two branches considered their basic training period too short. The predominant pattern of responses for each branch was: length "about right," quality "good" and content "partially appropriate."

Navy dentists had served an average of 29.0 months, compared to 26.7 months for Army dentists and 25.1 months for Air Force dentists (Table 9). Army dentists had spent a greater amount of time overseas than dentists in the other two branches. The percentage of dentists who had served overseas was 37.5 per cent of Army dentists, 44.1 per cent of Navy dentists and 31.6 per cent of Air Force dentists.

Table 10 presents the breakdown of time in military service according to weeks spent in various activities. The percentage of weeks spent in professional duty as a dentist varied from 86.3 per cent for Army dentists to 88.9 per cent for Air Force dentists and 90.5 per cent for Navy dentists. Navy dentists spent the least time in orientation and basic training (2.4 weeks) and Army dentists the most (5.9 weeks).

The way in which professional duty time was spent is shown in Tables 11, 12,

Table 10 • Mean number of weeks spent in various activities as a dental officer

Activity	Army	Navy	Air Force
Orientation and basic training	5.9	2.4	3.6
Other processing, formal training, travel and leave	8.6	7.9	7.8
Other nonprofessional assignments	1.3	1.6	.7
Professional duty as a dentist	99.8	113.7	96.6
Total	115.6	125.6	108.7

Table 11 • Percentage distribution of respondents according to percentage of duty time devoted to treatment of military personnel

Per cent of time	Army		Navy		Air Force	
	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.
100	6.2	8.0	8.4	25.4	3.9	4.1
95–99	9.2	14.0	20.8	26.6	11.6	22.7
90–94	10.3	17.0	19.3	17.9	12.7	17.2
80–89	16.6	21.1	21.3	16.5	24.6	25.0
70–79	17.8	13.4	12.4	7.3	18.0	14.8
60–69	13.3	9.0	7.4	2.6	13.4	9.1
50–59	8.9	6.4	6.4	2.1	7.7	2.8
25–49	10.4	6.1	3.0	.8	4.6	2.8
1–24	5.9	3.3	1.0	.8	3.5	1.2
0	1.4	1.7	.0	.0	.0	.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Mean	69.9%	77.0%	83.1%	90.3%	76.0%	82.8%

Table 12 • Percentage distribution of respondents according to percentage of duty time devoted to treatment of dependents of military personnel

Per cent of time	Army		Navy		Air Force	
	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.
100	.0	.1	.0	.0	.0	.1
75–99	4.4	2.7	.0	.2	1.8	.5
50–74	8.6	3.7	.0	.0	4.9	1.6
35–49	10.7	5.2	1.5	.0	6.7	2.6
25–34	14.8	8.2	1.9	.0	11.3	6.0
13–24	18.0	17.5	3.5	.4	25.7	14.5
8–12	14.2	20.6	9.9	1.6	17.9	23.7
3–7	4.7	14.2	7.9	6.7	10.6	25.1
1–2	4.2	11.9	10.9	22.6	8.5	17.6
0	20.4	15.9	64.4	68.5	12.6	8.3
Total	100.0	100.0	100.0	100.0	100.0	100.0
Mean	23.1%	15.6%	3.4%	1.1%	17.9%	11.0%

13 and 14. Mean percentages are presented; although it is generally not valid to average percentages, inasmuch as the large majority of dentists served approximately the same length of time, the error incurred in this instance is very small.

The percentage of duty time devoted to treatment of military personnel was greatest for Navy dentists and least for Army dentists, both in the United States and overseas. Navy dentists spent much less time than dentists in other branches

Table 13 • Percentage distribution of respondents according to percentage of duty time devoted to dental administrative duties

Per cent of time	Army		Navy		Air Force	
	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.
100	.3	.4	.0	.0	.0	.0
75–99	.3	.3	.0	.4	.7	.3
50–74	1.2	1.0	.5	.8	.0	.1
35–49	.9	.6	.5	.2	.3	.5
25–34	2.1	.7	3.0	.8	.3	1.9
13–24	5.6	3.4	10.9	5.7	5.6	3.0
8–12	16.0	8.0	19.3	10.2	18.5	11.4
3–7	19.3	12.8	26.7	20.0	24.2	21.2
1–2	10.1	10.6	9.9	15.7	10.2	13.4
0	44.2	62.2	29.2	46.2	40.2	48.2
Total	100.0	100.0	100.0	100.0	100.0	100.0
Mean	6.0%	4.0%	6.8%	4.5%	5.1%	4.1%

Table 14 • Percentage distribution of respondents according to percentage of idle duty time

Per cent of time	Army		Navy		Air Force	
	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.
100	.0	.3	.0	.0	.0	.0
75–99	.0	.3	.9	.2	.4	.0
50–74	1.5	.8	.9	.2	.0	.4
35–49	.3	1.1	2.0	1.0	.7	.7
25–34	.9	2.7	3.5	1.6	.7	2.1
13–24	4.1	4.4	4.5	7.1	3.8	4.5
8–12	8.6	9.9	11.4	11.0	6.6	11.4
3–7	13.0	11.3	13.0	12.7	10.9	15.9
1–2	5.3	5.6	7.9	6.7	8.1	7.5
0	66.3	63.6	55.9	59.5	68.8	57.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Mean	3.7%	4.8%	6.1%	4.3%	2.9%	4.0%

treating dependents of military personnel. For each branch the percentage of time spent in treating dependents was greater overseas than in the United States.

The percentage of duty time devoted to dental administrative work did not vary much among the three branches, and averaged about 6 per cent overseas and about 4 per cent in the United States. Idle duty time ranged from 2.9 per cent among Air Force dentists overseas to 6.1 per cent among Navy dentists overseas.

The frequency with which each type of dental service was provided to dependents is shown in Table 15. In each branch, the services provided most frequently were "amalgam and silicate fillings" and "oral surgery." This was a multiple choice type question and many dentists failed to check an answer; it is believed that the majority of these dentists failed to answer because they had not provided service to dependents.

Dentists were asked to list the stations to which they were assigned and to indicate whether there was a sufficient number of civilian dentists in the vicinity of these stations to provide the required dental care to dependents of servicemen. For all United States stations listed, a "yes" answer was given by 63.4 per cent of Army dentists, 78.6 per cent of Navy dentists and 77.4 per cent of Air Force dentists; about 2 per cent indicated they

Table 15 • Percentage distribution of respondents according to replies to the question: "If you provided dental service to dependents of military personnel, please check approximate relative frequency with which you provided services in the following categories."

Branch and frequency	Type of service provided to dependents											
	Amalgam and silicate fillings		Inlays, crowns and bridges		Dentures		Oral surgery		Periodontal treatment		Orthodontic treatment	
	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.	Overseas	U.S.
Army												
Frequently	64.8	42.7	8.1	2.3	18.4	8.2	49.0	31.6	20.2	7.0	3.8	.4
Occasionally	9.2	13.4	40.6	20.5	35.2	21.0	23.9	23.4	38.3	26.7	9.8	2.6
Never	5.8	2.9	27.1	33.6	21.9	28.2	6.6	5.3	18.4	21.6	60.5	51.7
No answer	20.2	41.0	24.2	43.6	24.5	42.6	20.5	39.7	23.1	44.7	25.9	45.3
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Navy												
Frequently	13.2	3.1	.4	.0	.4	.2	11.0	5.7	2.2	.4	.0	.2
Occasionally	18.9	14.0	4.8	2.4	5.3	1.6	21.6	25.4	16.7	10.6	2.2	.2
Never	10.6	18.7	34.4	31.1	33.9	31.7	10.1	6.7	21.2	23.6	37.4	32.9
No answer	57.3	64.2	60.4	66.5	60.4	66.5	57.3	62.2	59.9	65.4	60.4	66.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Air Force												
Frequently	61.7	31.9	3.8	1.1	9.0	.2	54.5	49.9	15.9	7.6	2.1	1.3
Occasionally	19.3	33.5	32.1	17.7	43.8	1.6	27.2	23.3	42.4	33.1	11.7	4.9
Never	6.2	7.5	46.5	50.9	30.0	31.7	4.8	2.5	24.5	29.4	68.6	62.4
No answer	12.8	27.1	17.6	30.3	17.2	66.5	13.5	24.3	17.2	29.9	17.6	31.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

didn't know, and the remainder indicated there were not enough civilian dentists to care for dependents.

Respondents were asked, "Did many servicemen express the opinion that the Armed Forces should provide general dental care to dependents of servicemen?" "Yes" was the answer of 81.6 per cent of Army dentists, 57.9 per cent of Navy dentists and 84.6 per cent of Air Force dentists.

The following question was asked: "Was it your experience that military personnel in the period of basic training were not given sufficient time for the required number of dental appointments?" To this question a "yes" answer was given by 48.7 per cent of Army dentists, 60.4 per cent of Navy dentists and 58.0 per cent of Air Force dentists.

In order to identify service-connected dental conditions, the Veterans Administration needs an accurate record of the dental conditions of military personnel both at time of entrance into and release from military service. Therefore, respondents were asked whether oral x-ray pictures were taken of all servicemen at both induction and discharge. Replies, given in Table 16, indicated this practice was followed more generally in the Navy and in the Air Force than in the Army.

Respondents were asked to rate seven aspects of dentistry in the branch of the Armed Forces in which they served. Responses are shown in Table 17. A summary of these ratings is shown in Table

Table 16 • Percentage distribution of replies to the question: "To your knowledge, were oral X-ray pictures taken of all military personnel both at time of entrance into and release from military service?"

Reply	Army	Navy	Air Force
Yes	43.7	63.2	61.2
No	32.5	21.2	23.8
Not in a position to know (or no response)	23.8	15.6	15.0
Total	100.0	100.0	100.0

Table 17 • Percentage of respondents replying as indicated to the question: "Please rate and comment on any or all of the following aspects of dentistry in the branch of the Armed Forces in which you served."

	Army	Navy	Air Force
System of dental record-keeping			
Excellent	20.6	35.8	26.5
Good	50.0	50.6	56.6
Fair	21.1	10.2	12.3
Poor	6.4	1.8	3.6
Adequacy (quantity and quality) of supplies and equipment			
Excellent	13.3	20.1	7.2
Good	36.5	45.5	36.6
Fair	28.6	24.0	37.2
Poor	18.1	6.9	16.4
Arrangement of facilities			
Excellent	14.8	19.1	15.5
Good	50.0	60.4	50.2
Fair	24.2	14.8	25.0
Poor	7.2	2.4	7.4
Availability, utilization and training of auxiliary personnel			
Excellent	5.2	10.8	4.6
Good	26.1	38.2	29.1
Fair	34.7	34.2	42.1
Poor	31.2	14.0	22.3
Efficiency of dental laboratory set-up			
Excellent	15.3	15.2	11.2
Good	39.7	39.6	34.2
Fair	25.8	21.7	33.3
Poor	13.6	10.2	18.9
Quality of dental services provided			
Excellent	24.3	29.5	26.2
Good	51.9	53.7	59.1
Fair	15.5	11.4	11.1
Poor	2.7	1.8	1.0
Competence of dental administrators			
Excellent	9.6	10.2	10.9
Good	30.1	40.4	35.8
Fair	25.5	26.8	28.4
Poor	27.2	15.3	20.1

18. In each branch, the two aspects of military dentistry which ranked the lowest were (1) availability, utilization and training of auxiliary personnel and (2) competence of dental administrators. The two aspects that ranked highest in each branch were (1) quality of dental services provided and (2) system of dental record keeping.

The returns from Army dentists indicated that a new system of dental record-keeping had been adopted during the period covered by this survey. Those dentists who had used the new system commented very favorably on it.

Nearly three fourths of all respondents reported that dentist productivity (amount of work done per day) was lower in the Armed Forces than in private practice (Table 19). Responses to this question were very similar for the three branches of service, slightly more "lower in service" responses being received from Navy dentists, and slightly more "higher in service" responses being received from Army dentists.

Table 18 • Average ratings* on seven aspects of dentistry in the Armed Forces

Aspect of military dentistry	Army	Navy	Air Force
System of dental record-keeping	2.9	3.2	3.1
Adequacy of supplies and equipment	2.5	2.8	2.4
Arrangement of facilities	2.8	3.0	2.8
Availability, utilization and training of auxiliary personnel	2.1	2.5	2.2
Efficiency of dental laboratory set-up	2.6	2.7	2.4
Quality of dental services provided	3.0	3.2	3.1
Competence of dental administrators	2.2	2.5	2.4

*Averages were obtained by applying the following scale to data in Table 17: Excellent = 4, good = 3, fair = 2 and poor = 1.

Table 19 • Percentage distribution of replies to the question: "In your opinion how does the productivity (amount of work done per day) of the average dentist in military service compare with that of the average civilian dentist?"

Reply	Army	Navy	Air Force
Much higher in service	3.6	2.3	2.6
Somewhat higher in service	6.3	5.8	5.7
About the same	17.3	15.5	18.6
Somewhat lower in service	40.8	41.0	40.9
Much lower in service	32.0	35.4	32.2
Total	100.0	100.0	100.0

Table 20 • Percentage distribution of replies to the question: "In general, what is your opinion regarding the number of dentists assigned to the units in which you served?"

Reply	Army	Navy	Air Force
Understaffed	21.5	26.6	31.4
Overstaffed	19.1	9.3	11.7
Neither understaffed nor overstaffed	51.2	58.9	47.5
Varied from post to post	8.2	5.2	9.4
Total	100.0	100.0	100.0

The percentage of respondents, by branch of service, who thought the units in which they served were understaffed with dentists was highest in the Air Force (31.4 per cent) and lowest in the Army (21.5 per cent) (Table 20). In all three branches, more dentists checked "understaffed" than "overstaffed," although the difference was very small in the Army.

To the question "In your opinion, was there continuing and effective effort toward increasing efficiency of dental practice methods at the stations where you served?" about 15 per cent in each branch did not respond or stated the situation varied from post to post. "Yes" was the reply of 60.0 per cent of Navy dentists, 54.1 per cent of Air Force dentists and 49.5 per cent of Army dentists.

The question "Were dental laboratory technicians assigned work not ordinarily assigned to technicians in commercial dental laboratories?" was answered "no" or "don't know" by about 70 per cent of the dentists in each branch. Approximately 12 per cent in each branch mentioned nondental duties, such as miscellaneous clean-up assignments, errand-running and so forth. In each branch, between 2 and 3 per cent of the respondents mentioned that dental technicians served as dental assistants. Less than 1 per cent reported that technicians did prophylaxes, and a few dentists from each branch stated that technicians occasionally designed dentures, took impressions or made adjustments on prosthetic appliances.

Dentists participating in the survey were asked to suggest ways to make military service more attractive to dental officers and to record inequities observed in military service (Table 21). The most frequent comment was to the effect that dentists in service should be allowed to do all types of dentistry. This comment was

Table 21 • Percentage of respondents replying as indicated to the question: "Please indicate ways in which you believe military service can be made more attractive to dental officers. What inequities, if any, did you observe?"

Comment	Army	Navy	Air Force
Military organization			
Have more permanent assignments—keep families together—offer more opportunity to choose place of assignment	11.8	22.2	18.5
De-emphasize military aspects—emphasize professional aspects—eliminate rank—military service was complete waste of time—military service cannot be attractive during peacetime	11.7	8.3	7.4
Promotions should be based on professional competence—quality rather than production should be criterion for efficiency	8.3	4.9	5.9
Separate the dental department from the medical department	3.5	1.4	12.5
Military service was an educational experience—received valuable training	4.1	5.3	5.1
Discrimination between regulars and reserves should be stopped	4.0	3.3	2.7
Adjustment to military service depends on individual personality traits and attitudes	1.2	2.6	1.9
Promotions should be more rapid	1.2	1.0	1.1
Job satisfaction			
Dentists should be allowed to do all types of dentistry, either continuously or by rotation—eliminate amalgam line	26.8	42.5	23.8
Need better control of supply and quality of dental equipment and materials—allow local purchases	6.0	4.3	9.7
Allow independent professional judgment—assign specialists to their specialty—consult dental officers in purchase of supplies and equipment	7.1	4.9	7.3
Eliminate production quotas—stop informal pressures for production	3.8	2.8	2.7
Need a better balance between number of auxiliary personnel and dentists—better trained auxiliaries needed—civilian auxiliaries preferred	3.0	1.8	3.5
Do not use dentists as administrators—let dentists do dentistry	2.2	2.8	2.8
Dentists should have fewer nondental (military) duties	3.5	2.7	1.5
Military dental clinics should be more like private dental offices—procedures, physical arrangements and general atmosphere should be more similar to private offices	1.3	1.8	1.2
Immediate supervision			
Commanding dental officer(s) played favoritism, did not know how to handle professional people, did not know how to lead—commanding dental officer(s) too interested in own military career to be concerned with needs of his subordinates; needed training in leadership and administration	23.0	14.0	16.5
Commanding dental officer(s) were not well versed in dentistry	4.1	4.3	3.8
Eliminate dental commanding officers who have no regard for their profession	4.1	2.0	3.4
Interpersonal relations with fellow officers			
Career men, especially high ranking officers, did little work—too many high ranking officers, hence, too many "administrators"	4.9	5.1	3.3
Most reserve officers (two year men) were not treated as professionally as they should have been by the regular officers	5.6	3.7	2.7
Higher ranking officers were not necessarily the best qualified to make decisions as to proper dental treatment—"bossiness" was too common	2.8	1.6	2.3
Pay and benefits			
Higher pay needed	15.5	12.0	23.0
Need more postgraduate courses—more seminars—time off to attend scientific meetings—more encouragement for educational advancement	11.0	8.6	16.0
Provide better living quarters—better housing facilities for dependents	4.5	4.1	5.9
Pay was not the main problem—pay was adequate	1.2	2.4	2.4
Pay should be equal for single and married men—use incentive pay	1.1	2.0	1.5

Table 22 • Percentage of respondents replying as indicated to the question: "Do you have any suggestions as to how the American Dental Association and its constituent and component societies can render better service to its members who are serving in the Armed Forces?"

Comment	Army	Navy	Air Force
Over-all welfare of dental personnel			
Set up grievance and inspection committee to tour military installations and hear complaints of dental officers—send questionnaires to dental officers	7.3	4.7	7.3
Constantly campaign for satisfactory professional environment for dental officers	5.1	4.9	4.6
Local dental societies should work more closely with dental officers	2.2	3.0	4.4
Take action to separate dental department from medical department	2.0	.0	5.8
The Association should correspond with and provide information of importance to dental officers	1.4	1.6	2.5
A committee of the Association should pass on policies or programs proposed by the Armed Forces—Association should serve in an advisory capacity	1.3	1.0	1.1
Working conditions, pay and promotions			
Campaign for less emphasis on production—campaign for well-rounded clinical experience—set up standards of quality and clinical procedure	8.9	6.3	4.1
Campaign for better qualified leadership and administrators	3.8	4.7	3.7
Obtain increased pay and benefits	1.6	1.2	2.2
Exert pressure on the Armed Forces to adopt newer equipment, materials and technics	1.6	.4	2.2
Make sure dentists are given ranks commensurate with professional experience—make sure promotions are given when due	1.3	.8	.8
Educational services			
Get dental corps to permit dental officers to attend scientific meetings, postgraduate courses, etc.	4.5	2.2	4.5
Extend invitations to professional activities, meetings, seminars, etc.—provide members with information regarding meetings held in the locality	2.3	3.5	3.6
Conduct more educational courses for Armed Forces dentists (lectures, seminars, films)—provide correspondence courses, especially for those overseas and in outlying regions	2.1	.6	2.0
Keep Armed Forces dentists informed on all new phases of dentistry	1.1	1.0	1.7
Send dentists The Journal without dues—on time—with correct address	1.7	.4	1.0
Miscellaneous			
Commendatory remarks about American Dental Association	1.4	3.0	2.1
Advise incoming dentists as to what they can expect from service life (good and bad)—instill proper military attitudes	2.3	1.6	1.6
Eliminate draft—have voluntary service—use civilian dentists	1.7	.8	.8
Eliminate or lower dues for dental officers	1.7	.8	1.6

made by 42.5 per cent of Navy dentists, 26.8 per cent of Army dentists and 23.8 per cent of Air Force dentists.

Criticisms of the commanding dental officer constituted the second most frequent comment. Most of these criticisms related to lack of leadership ability.

The two other most frequent suggestions were "have more permanent assignments and allow dentist to choose place

Table 23 • Percentage of respondents replying as indicated to the question: "Do you have any suggestions as to how the American Dental Association and its constituent and component societies can help the dentist when he is being released from military service?"

Comment	Army	Navy	Air Force
Provide information to help the dental officer locate where he is needed—provide information regarding job opportunities—provide information regarding association with another dentist	19.4	18.7	23.0
Provide information on how to select an office—provide service in practice management—provide fee schedules for various areas	3.8	3.7	4.2
Reduce or abolish membership dues for at least a year	2.9	1.6	2.6
Provide financial assistance, loans	2.4	2.2	2.2
Use National Board for all states—abolish state board examinations	2.3	2.4	1.6
Set up local society "welcome home" committees to assist dentist as needed	1.6	1.8	1.8
Organized dentistry rather than commercial dealers should assist in locating and selecting new office	.3	1.2	1.0

of assignment" and "provide better pay."

Respondents were asked to indicate how the Association and its affiliated societies could be of more service to the dentist in the Armed Forces and to the dentist being released from military service. The replies are shown in Tables 22 and 23. A number of dentists suggested that the Association establish a "grievance and inspection committee" to tour military installations and hear complaints of dental officers. Another relatively common suggestion was that the Association campaign for less emphasis on production and for well-rounded clinical experience for the dentist in the Armed Forces. By far the most common suggestion relating to help for the dentist being released was that he be helped in finding a good practice location or salaried position.

A comparison of the findings of this survey with the findings of the two earlier surveys reveals effects of changes of policies and practices in the Armed Forces dental corps. For example, dissatisfaction with pay has decreased along with pay increases. Trends in Armed Forces dentistry may be discerned by a study of the three surveys.

1. Survey of former armed forces dental officers, J.A.D.A., 49:571, Nov., 1954; J.A.D.A., 52:730, June, 1956.

book reviews

TRANSACTIONS OF THE SECOND INTERNATIONAL CONFERENCE ON ENDODONTICS

Edited by Louis I. Grossman, D.D.S. Second edition. 188 pages. $5. Philadelphia, School of Dentistry, University of Pennsylvania, 1958.

This flexible paper-covered manual is a compilation of the lectures and papers presented at the Second International Conference on Endodontics, June 22-28, 1958.

The purpose of this conference was to exchange ideas, to present the most significant advances in endodontic procedures, to obtain a better understanding of the basic principles underlying endodontic practice, and to review the current concepts and research in several countries. The papers were given by outstanding investigators, teachers and clinicians, and represented a well balanced program. Aside from diagnosis and treatment, interest was focused on pathology, pharmacology, microbiology and a daily summary of the proceedings by those in attendance.

As the editor states, "the papers presented in this volume are published as they were read at the conference with very little or no editing." It is regrettable that a subject index is lacking. With few exceptions the literature is well reviewed. Certain sections devote much space to more or less irrelevant details. Nevertheless on the whole, the balance holds the reader's interest.

This timely manual brings together information from many sources on the present state of knowledge concerning endodontic treatment. It can be recommended to endodontists and general practitioners who want to extend their knowledge of endodontics. The quality of paper is good and the printing clear.

E. Alan Lieban

THE GATEWAY TO HEALTH

By Ira Jay Berlove, D.D.S., M.D. 148 pages with 9 illustrations. Index. $3.50. New York, Whittier Books, Inc., 1958.

The stated purpose of this book is to inform the layman about dental health and the interrelationships of the teeth, mouth and other parts of the body. There are 21 chapters made up of many long paragraphs and only nine illustrations. Seven of the illustrations are roentgenograms, very poorly reproduced, with details barely discernible.

It is doubtful that many laymen will be motivated to read this text. Those who do, however, will obtain a good deal of misinformation. As an example, the author states that if deciduous teeth "are of inferior quality, it is because the diet of the expectant mother has not been adequate." Chapters entitled "Tooth Decay," "Pyorrhea" and "Bond Absorption" contain little information that is supported by scientific fact.

To prepare a book devoted solely to dental health, that is scientifically accurate and that will capture and maintain a layman's interest, is no easy task. It is unfortunate that the author and publisher have failed to achieve these goals.

W. Philip Phair

THE ADMINISTRATION OF HEALTH EDUCATION AND PHYSICAL EDUCATION

By Jesse F. Williams, M.D., Sc.D.; Clifford L. Brownell, Ph.D., and Elmon L. Vernier, Ed.D. Fifth edition. 387 pages. Index. $4.75. Philadelphia, W. B. Saunders Co., 1958.

In this new edition, various features have been introduced, all adding appreciably to the practical usefulness of the volume. Because of its

increasing importance, there is a chapter on safety education and the administrative aspects of this subject. An extensive program outline, including 25 suggested teaching activities and details of technics and methodology of safety instruction, is presented.

This is an extremely practical book with complete coverage because of the extensive experience of the authors. There is commendable emphasis on the real meaning of fitness as contrasted with the ideas of some who think of it only in the physical category. Perhaps it would have been desirable to place less responsibility for health services on the school physician and dentist and more on private practitioners.

The subject matter is presented in four parts; leadership, program, facilities, and community and state aids. The largest of these sections is that concerned with programs. This includes a good chapter on various aspects of health instruction, with recognition of the importance of having a teacher with this his full responsibility rather than a teacher in a dual role.

Another new feature is the inclusion at the end of each chapter of a series of problems for discussion. Based on chapter content, they are useful in providing means of evaluating absorption and understanding by the student, and serve to reinforce the teaching.

William W. Bolton

DENTAL MANPOWER NEEDS IN NEW ENGLAND

Published by the New England Board of Higher Education. 79 pages. Index. Winchester, Mass., 1958.

This report, the result of cooperative effort of interested and dedicated persons, should command the attention of all who are seriously concerned with the adequacy of higher educational facilities to meet demand for improved dental health for the people of New England.

The report, which deals with matters of importance, should receive the attention not only of those who have the responsibility of providing education at professional levels but also New England people generally, and especially those who are interested in dentistry as a career in the area.

The projected manpower needs based on estimated population growth are both reasonable and logical, especially in view of the increasing public awareness of the importance of dental health care and its relationship to general physical well being.

The report is adequately illustrated with tables and graphs. Its contents should have a salutory effect upon those who are committed to the provision of adequate facilities in fields of higher education, those who are engaged in, and those who may contemplate, the practice of dentistry as a career in New England.

R. C. Dalgleish

XV CONGRÈS FRANCAIS DE STOMATOLOGIE (XV FRENCH MEETING ON STOMATOLOGY)

284 pages with illustrations. Fr. 2.000 Paris, Masson & Co., 1957.

This work presents four research review reports on the following subjects:

"Recurring Maxillary Tumors, Exclusive of Cancer" by M. Parant and J. Vigneul.

"Geriatrics and Stomatology" by J. F. Laroche, A. Cartier and R. Cayron.

"Periodontics and Operative Dentistry" by Jean Chatellier.

"Bridgework on Vital Abutment Teeth" by R. Thibault and R. LeHuche.

The first article presents a thorough discussion of a relatively controversial subject. After general remarks, the various tumors—ameloblastoma, giant cell tumors, fibroma, chondroma, myxoma, angioma, neurinoma, neurofibroma and eosinophilic granuloma—are discussed from the clinical, pathological, diagnostic and therapeutic points of view.

Because of the relative infrequency of those tumors, the authors conclude that no general rules with regard to management can be given and each case should be evaluated individually. Several statistical tables are given comparing results of different types of treatment. It is of interest to mention that when treatment of ameloblastomas by curettage is used, there is the highest incidence of recurrence. En bloc dissection appears to give the best results. This finding is in agreement with statistical studies in this country.

The problems of reconstructive surgery are reviewed briefly. The bibliography is divided into several sections according to the type of tumors and cites many recent American articles.

The second article presents an extremely interesting and complete review of geriatrics and stomatology. It is one of the first extensive studies the reviewer has read that presents a comprehensive analysis of all the problems of old age and stomatology. After a fascinating introduction into the very nature of aging on molecular, cellular and tissue levels, the authors study the relationship of aging in organs as related to function. In another section, the

anatomy of the oral cavity of the aged is described. A systematic review follows of all lesions in the teeth, pulp, periodontium, soft tissues or maxillae of old people. Special emphasis is given to infections in old age and to tumors. Cancer in relation to geriatrics is stressed. Salivary gland pathology and traumatic injuries are also covered. Treatment is discussed emphasizing resistance and old age. Proper evaluation of old patients and their general preparation before surgery are stressed. Complications of surgical treatment are mentioned briefly. Concluding this review is a short section on fixed and removable prostheses as well as the importance of a good diet in geriatrics.

The two last and shorter reports are of a much lesser value and do not present any new findings. The subject matter on pedodontics as well as fixed bridgework is familiar to the modern practitioner.

The material is logically presented and written in an appealing and fluent style. Type size, style and paper are excellent; binding is poor. The review articles will be profitable reading for both specialists and general practitioners. *Ernest Baden*

DIE VERHÜTUNG
VON STELLUNGSANOMALIEN
(PREVENTION OF MALOCCLUSION)

By Julius Jantzen, M.D. Second enlarged edition. 76 pages with 128 illustrations. Bibliography. DM. 12. Heidelberg, Alfred Hüthig, 1958.

The question of when to initiate orthodontic treatment has always been a debatable one. The author does not advise too early a treatment. However, he stresses the difference between prevention and treatment, and maintains that preventive measures cannot be started early enough. He talks not only to the orthodontist but to the general dental practitioner as well who has the responsibility of early recognition of the development of malocclusions and their prevention.

The reader's first impression is, "How can so extensive a problem be dealt with in such a small volume?" It has been done, and done well. Extensive instructions are given on how to tackle these problems, with discussion of preventive measures for newborn children as well as for the deciduous dentition. Of special interest are the chapters describing gadgets for the prevention of thumbsucking, and the Andresen-Häupl activator whose function is to coordinate the relative position of the lower jaw to the upper one.

The book is a compilation of the author's lectures to postgraduate groups. This explains its short but thorough coverage of the material. It is regrettable, though, that no index is offered, and that apparently none of the non-German literature has been used, but this does not minimize the value of the book.

The printing is condensed and the type rather small, but the illustrations are clear and distinct. *Paul M. Doctor*

BOOKS RECEIVED BUT NOT REVIEWED

RADIOACTIVE SULPHUR AS BENZIDINE SULPHATE: A METHODOLOGICAL STUDY WITH SPECIAL REFERENCE TO S^{35}-LABELLED PENICILLIN IN ORAL SURGERY (Acta Radiologica Supplement 166) • By Erik Agren. 108 pages with illustrations. Sw. Kr. 30:00. Acta Radiologica, Box 2052, Stockholm 2, Sweden, 1958.

TRANSACTIONS OF THE CANADIAN DENTAL ASSOCIATION ANNUAL MEETING, MONTREAL, QUEBEC, OCTOBER 22-25, 1958 • 212 pages. Canadian Dental Association, 234 St. George St., Toronto 5, Ontario, Canada, 1958.

THE NUFFIELD FOUNDATION THIRTEENTH REPORT—Report for the year ended March 31, 1958 • 188 pages. Nuffield Foundation, Nuffield Lodge, Regent's Park, London N.W.1, England, 1958.

PROSTHETIC DENTISTRY: ESSENTIALS OF STRESS BREAKER TYPE PARTIAL DENTURE PROSTHESIS • By Mitsuru Okada. 603 pages. Kyoto Nagasue (Nagamatsu) Bookstore, Tokyo, Japan.

TUMORS OF THE ORAL REGIONS • Edited by Hamilton B. G. Robinson, D.D.S., M.S., 143 pages with illustrations. $3. W. B. Saunders Company, West Washington Square, Philadelphia 5, 1958.

THE ROCKEFELLER FOUNDATION ANNUAL REPORT, 1957 • 372 pages with illustrations. Rockefeller Foundation, 49 W. 49th St., New York City.

SURVEY OF DENTAL CLINICS IN METROPOLITAN CHICAGO, 1956-1957 • Made by the Welfare Council of Metropolitan Chicago with the cooperation of the Chicago Dental Society. 55 pages with illustration. $1.25. Welfare Council of Metropolitan Chicago, 123 W. Madison St., Chicago, 1958.

current literature

TEN RULES TO PRESERVE THE HEALTH AND YOUTH OF PROFESSIONAL MEN

By Edward L. Bortz. Science Digest 45: 49 Jan. 1959.

The following ten rules of a "do-it-yourself" health program for professional men are proposed:

1. Eat a balanced diet consisting of plenty of proteins, vitamins and fluids and less fats and carbohydrates.
2. Get plenty of rest for both the mind and the body.
3. Cultivate a sense of humor because it is the best antidote for professional stress and tension.
4. Pursue interesting and specific recreational activities.
5. Encourage regular elimination of waste products.
6. Avoid excessive emotional tensions because they may lead to professional ineffectiveness.
7. Have pride in your profession.
8. Participate in community and professional affairs.
9. Continue to expand your professional knowledge, skill and experience.
10. Cultivate the loyalty of your patients, friends and members of your own family.

STANNOUS FLUORIDE CLINICAL STUDY IN OLMSTED COUNTY, MINNESOTA

By William A. Jordan, John R. Snyder and Viktor Wilson. Pub. Health Rep. 73:1010 Nov. 1958.

An 8 per cent stannous fluoride solution was applied once to the erupted permanent teeth of 12 and 13 year old students in the rural and village schools of Olmsted County, Minn., to determine the solution's ability to inhibit caries for one year. The 510 students were divided into almost identical control and experimental groups.

At the end of one year, the experimental group had 20 per cent fewer newly carious teeth than the control group, and 14.5 per cent fewer newly carious tooth surfaces than the control group. Proximal and occlusal tooth surfaces benefited from the treatment; inexplicably, there was a reverse result in the buccolingual surfaces where 30 per cent more caries were found in the experimental group than in the control group; the analysis at the end of the second year may shed light on this situation.

A second application of the 8 per cent stannous fluoride solution was made at the end of the first year, and its effects will be studied this year.

ADAMANTINOMA: REPORT OF 14 CASES

By F. Baclesse and G. Letouze. Presse méd. 58:372 April 5, 1958.

Adamantinoma is not a common tumor. Over a period of 30 years, 14 patients with adamantinoma were seen at the Hospital of the Curie Foundation in Paris, and only ten received treatment. In this series, the ages of the patients varied from 13 to 69 years.

In 12 patients the tumor occurred in the lower jaw, and in two in the upper jaw.

Roentgenographically there were three varieties: (1) an areolar type (infrequent) with a "honeycomb" appearance; (2) a multicellular type (most frequent adamantinoma observed) with a "Swiss cheese" appearance, and (3) a unicellular type (less frequent than the multicellular type) with a "soap bubble" appearance.

In the differential diagnosis, giant-cell sarcoma, oral metastasis from glandular epithe-

lioma and mixed tumors of the salivary glands should be considered.

Adamantinoma grows slowly and produces lymphatic or visceral metastasis only in rare instances. Localized malignancy is its main characteristic.

Treatment consists of complete surgical excision beyond the region of the tumor and extending into the healthy bone. Recurrence, however, is frequent and that is one of the reasons why immediate surgery is indicated because the tumor itself is resistant to roentgen or radium rays.

Even after successful enucleation, it is advisable to make roentgenograms of the operated region twice a year for at least ten years.

THE NATURE AND COMPOSITION OF THE BACTERIAL ORAL FLORA

By K. A. Bisset. Internat. D. J. 8:528 Sept. 1958.

Although a large body of published research on the subject of dental caries exists, dating from the early days of medical bacteriology, such research has failed to solve the problem of dental caries. There is a logical explanation for this failure. In the classical investigations of bacterial disease, a standard approach, crystallized in Koch's postulates, has been adopted. It implies certain fundamental assumptions which are true for most diseases, but not for dental caries. These assumptions are that the tissues or body fluids concerned normally are either sterile or support a typical and recognizable flora. But the human mouth contains many types of bacteria, and the bacterial content of different mouths varies. What is lacking is an adequate knowledge of the system of the oral flora, and it is this lack which has invalidated a great deal of otherwise excellent research work.

The first requirement for an improvement of knowledge of the oral flora is further research, directed toward the extension of information concerning the bacterial content of the oral cavity. An obvious example of a wide gap in the present knowledge is the great number of unidentifiable streptococci which are found in the mouth; another is the problem of Leptotrichia which, by visual examination, appear to be the commonest of all bacteria in scrapings from the teeth.

Many demographic and clinical studies on the incidence and distribution of bacteria in the human mouth are almost valueless or actually misleading, because the oral bacteria either have not been identified or have been wrongly identified or have been so vaguely described that it is impossible to learn whether they were properly identified. Reports of the presence or absence of microbial species such as Actinomyces, Lactobacillus and Fusibacterium have depended more on the competence and experience of the observer than on any other factor, and these three genera are surely of the greatest importance in the solution of the problem of the bacteriology of caries. Such surveys should be repeated in the light of the newer information.

RADIATION DOSE REDUCTION IN DENTAL ROENTGENOGRAPHY

By Lewis E. Etter, S. S. Sidhu and L. C. Cross. Am. J. Roentg. 80:926 Dec. 1958.

Until recently, dentists have been equipped with x-ray machines of low kilovoltage and current capacities, coarse mechanical timers accurate only in seconds, with no provision for filtering the beam and no use of limiting diaphragms. Moreover, most dentists use a focal-film distance of only 8 inches instead of long-tube technics; many dentists prefer the relatively slow dental film or single emulsion types to the fastest films recently developed. Most means of reducing radiation dosages are not being utilized by the average dentist.

Radiation dosages can be reduced in present dental x-ray machines by employing at least 2 mm. of aluminum filtration (or 0.375 mm. copper plus 0.5 mm. aluminum, as recommended in 1957 by Yale and Goodman) plus a lead diaphragm and ultraspeed film.

With conventional technic, a dental roentgenogram of superior contrast can be produced, but with a resultant dose of about 16.2 r per film. The addition of 2 mm. aluminum filtration reduces the dosage by more than 50 per cent, to 7.6 r; by increasing the voltage to 90 and 100 kvp, the filtration to 2 and 3 mm. aluminum, the focus to film distance to 16 inches, and by using the fastest film, satisfactory roentgenograms can be made with 0.09 r and 0.08 r, respectively, in 1/10 second exposures. This dose amounts to 1/180th of the original dose of 16.2 r. The dose to the gonads with this technic is infinitesimal.

To take full advantage of known physical principles in reducing radiation exposure, the dentist should use higher kilovoltage x-ray machines capable of developing 90 kilovolts or more, with current capacities of 15 to 20 milliamperes, timers accurate to 1/20th of a second, long cone technics, and the fastest film.

FRACTURES OF THE CONDYLOID PROCESS

By M. Dechaume and others. Rev. Stomat. 38:189 April-May 1958.

Fractures of the condyloid process usually are caused by blows to the chin. If the impact occurs on the side of the chin, the body of the mandible on that side and the condyle on the opposite side may be fractured.

Such fractures have been observed frequently and described in various case reports.

Fractures of the condyloid process may be associated with displacement or dislocation of the condyle. Dislocation of the condyle usually occurs in instances of a high fracture. Overriding of the fragments is not unusual and, if it occurs, it increases the derangement of the articulation of the teeth. Other types of displacement or dislocation of the condyle may be caused by increased trauma if the blow occurs unexpectedly and the patient has kept his mouth open during the impact. Usually the condyle is then already well forward on the articular eminence and, therefore, can be easily displaced or dislocated in a forward direction. Similar displacements may be caused by direct blows or forward pulls of the lateral pterygoid muscle on the condylar fragment.

In instances of displacement of the condyloid process associated with fracture, the condyle is still in the articular fossa although in an abnormal position. Anterior displacement occurs far oftener than posterior displacement because of the forward pull exerted by the lateral pterygoid muscle. Medial displacement is rare because the zygomatic arch protects the region from trauma caused by direct violence. Lateral displacement is observed occasionally, and occurs as the result of an action of the elevator muscles on the ascending ramus. The fragments then press against the condyloid process and cause displacement.

Fractures of the condyloid process may be divided into two types: (1) condylar fracture-dislocation, and (2) subcondylar fracture (posterior oblique fracture of the ascending ramus).

The authors followed up 110 patients with fractures of the condyloid process and came to the following conclusions:

1. In children, a high fracture occurs frequently.

2. Condylar fracture-dislocation and subcondylar fractures occur unilaterally and bilaterally. In both unilateral and bilateral fractures, there is gagging due to contact on the molars of the affected side. This is the result of overriding of the fragments and the action of the elevator muscles. This also results in an anterior open bite. The patient usually is unable to protrude the mandible.

3. Fracture of the condyloid process associated with fracture of the body of the mandible on the opposite site occurs frequently. The fracture usually occurs on the side of the mandibular body that has received the impact of the blow. At this site, the posterior fragment is elevated. On the opposite side where the condyloid process is fractured, the ascending ramus is displaced in an upward direction. The anterior part of the mandible is drawn downward and slightly backward by the pull of the depressor muscles, causing open bite.

Ankylosis of the temporomandibular joint, associated with fracture of the condyloid process, was not seen.

WORTHLESS DRUGS ARE BEING MARKETED ON A LARGER SCALE THAN EVER BEFORE

By Edward Brecher and Ruth Brecher. Science Digest 44:21 Dec. 1958.

If a person desires to gain weight or to reduce; if he wants a stimulant to pep him up, a sedative to calm him down or a tranquilizer to relieve his anxieties; if he is troubled by asthma, colds, headaches, hemorrhoids, indigestion, lumbago, psoriasis, toothache, varicose veins or almost any other complaint—he should be cautious.

Hundreds of questionable therapeutic products are being sold to cater to the sufferer's desire for quick relief or cure. Some standard drugs such as aspirin are offered under fancy names and sold with exaggerated claims at high prices. The patient may pay large sums for pills and treatments which are utterly valueless. Self-treatment frequently delays consultation with a physician or dentist who is able to diagnose the symptoms accurately and plan the treatment.

In general, the pharmaceutical industry in the United States has earned public confidence through the years. When the patient takes a prescription to a pharmacy to be filled, he never doubts that the drug he receives will be precisely what has been prescribed, and that it will be compounded of ingredients which meet the established standards of purity and potency.

Some of the nonprescription products meet the same high standards; indeed, they are governed by the same laws and regulations.

Unfortunately, however, certain promoters of drugs capitalize on the public confidence in high-quality preparations and offer ques-

tionable or even worthless products. There exists no simple way for the average consumer to distinguish marginal drugs from the many therapeutic products which are honestly advertised, fairly priced, carefully compounded and accurately labeled.

Despite the continuing efforts of three government agencies—the Food and Drug Administration, the Federal Trade Commission and the Post Office Department—worthless drugs are being marketed today on a larger scale than ever before, thereby fleecing the public of large sums and endangering health.

During the last year, the Post Office Department closed down 152 fraudulent mail-order promotions of questionable drugs; these schemes were known to be taking in at least $225,000 daily.

The National Better Business Bureau reports that it has received during the same period ten times as many complaints about drug and cosmetic products as it did two years ago.

The patient's good health depends on his ability to distinguish between conditions which require the services of a physician or a dentist and the fleeting ailments which can be self-diagnosed and self-treated. Unscrupulous promoters, however, try to expand the area of self-diagnosis beyond its proper boundaries. They list a number of general symptoms which may be produced by many causative factors; the longer the list, the bigger the potential market. Then they assure the public that the product advertised is the only one to relieve these symptoms. They usually avoid the use of the word "cure," and seek to capitalize on the prestige of the medical or dental profession by insisting that the product is "used by thousands of physicians and dentists."

As a result of the combined efforts of the three government agencies, several hundred drug promoters are called to account each year. During the 1957 fiscal year, 333 offenders were convicted in the courts for criminal violations of the Food and Drug Act. This could have provided a warning to other unscrupulous promoters—but actually, the sentences meted out appeared far more like an invitation to crime than a deterrent. Of the 333 convicted violators, 233 were fined, the average fine being less than $1,000; 91 were placed on probation; six were sentenced to prison for six months or less, and three were given longer sentences, the longest being one year and a day.

Only nine of the 333 offenders suffered any actual interruption in their unlawful activity. Those fined, and all but a few of those placed on probation, were free to start all over again under other names with the same or new products.

Dentists, physicians and the general public may ask: "Why were so few of these 333 violators imprisoned?" Of these, 319 had pleaded guilty; only 14 put the Food and Drug Administration and the United States Attorneys to the trouble of a court trial. It is a common belief in the quack drug trade that almost any offender can, by pleading guilty, get off with a small fine or probation; and more than 95 violators out of 100 take advantage of this leniency.

The net effect of the low nationwide level of penalties makes irresponsible drug promotion an attractive field of enterprise.

CARCINOMA IN A HEALING ALVEOLUS AFTER DENTAL EXTRACTION

By W. N. Van Zile. J. Oral Surg., Anesth., & Hosp. D. Serv. 17:82 Jan. 1959.

A squamous carcinoma developed in a healing dental alveolus after routine extraction of a fractured maxillary incisor. The patient became aware of a gradually increasing "swelling" in the region and sought further treatment after the extraction.

A biopsy of the swollen tissue, which resembled pyogenic granuloma in appearance, revealed squamous cell carcinoma. Treatment consisted of a block excision of the maxilla containing the tumor. Gross examination of the specimen revealed the alveolus to be completely filled with neoplastic-appearing tissue. Microscopic diagnosis was reported as "squamous cell carcinoma arising from gingival mucosa involving a healing alveolus."

The patient has been followed for three years without recurrence of the tumor or metastatic involvement. No similar case has been reported in the literature insofar as the writer could ascertain.

deaths

Allen, Harry R., South Willington, Conn.; Harvard Dental School, 1898; died December 26; age 88.

Armstrong, Frederick T., Sioux Falls, S. D.; Chicago College of Dental Surgery, 1910; died December 8; age 75.

Auer, William E., Washington, N. J.; University of Pennsylvania School of Dentistry, 1922; died December 8; age 60.

Baggs, Linton D., Bainbridge, Ga.; Atlanta Dental College, 1898; died December 3; age 87.

Bailey, A. C. Ralph, Ferndale, Wash.; University of Southern California School of Dentistry, 1905; died November 25; age 78.

Baker, Carl B., Antigo, Wis.; Louisville College of Dentistry, 1900; died December 2; age 84.

Ball, Bertram, Yonkers, N. Y.; New York College of Dentistry, 1901; died December 4; age 79.

Beals, John H., Winchester, Ind.; Baltimore College of Dental Surgery, University of Maryland, 1901; died December 1; age 78.

Bennhoff, Eugene C., Fort Wayne, Ind.; Indiana University School of Dentistry, 1927; died December 6; age 56.

Bolender, George K., Detroit; University of Michigan School of Dentistry, 1918; died December 7; age 63.

Boone, Thomas J., Leavenworth, Kan.; Kansas City Dental College, 1919; died December 26; age 65.

Branchaud, Kenneth E., Cambridge, Mass.; Harvard Dental School, 1922; died July 23; age 58.

Brohel, Francis B., Amesbury, Mass.; Tufts College Dental School, 1924; died November 24; age 60.

Burk, Aubrey H., Paterson, N. J.; Baltimore College of Dental Surgery, University of Maryland, 1912; died November 27; age 68.

Butcher, Frank V., Point Pleasant, W. Va.; Ohio College of Dental Surgery, University of Cincinnati, 1902; died December 11; age 82.

Cather, Jesse H., Morgantown, W. Va.; Baltimore Medical College, Dental Department, 1909; died November 21; age 75.

Clausen, Carroll F., Maplewood, La.; Loyola University School of Dentistry, New Orleans, 1944; died December 9; age 44.

Comeaux, Walter L., Baton Rouge, La.; Loyola University School of Dentistry, New Orleans, 1919; died December 8; age 63.

Conley, Daniel E., David City, Neb.; Creighton University College of Dentistry, 1917; died October 30; age 65.

Cowan, Charles S., Sacramento, Calif.; University of California College of Dentistry, 1922; died December 24; age 66.

Cureton, Horace, San Jose, Calif.; College of Physicians and Surgeons, 1905; died December 9; age 84.

Darragh, Frank H., New Brighton, Pa.; University of Pennsylvania School of Dentistry, 1897; died August 31; age 84.

Davis, Wesley F., East McKeesport, Pa.; University of Pittsburgh School of Dentistry, 1926; died December 17; age 60.

Donaldson, William R., Salisbury, Pa.; Pittsburgh Dental College, Western University of Pennsylvania, 1904; died December 14; age 79.

Donze, Donald A., Fairview Park, Ohio; University of Detroit School of Dentistry, 1952; died December 20; age 34.

Drury, Robert J., Manteno, Ill.; Loyola University School of Dentistry, Chicago College of Dental Surgery, 1924; died December 10; age 59.

Eddy, Charles N., Boulder, Colo.; Omaha Dental College, 1905; died November 6; age 74.

Eller, Robert L., Washington, D. C.; Georgetown University School of Dentistry, 1914; died December 1; age 72.

Ely, John E., Westwood, N. J.; University of Maryland Dental Department, 1905; died October 28; age 77.

Evanson, Edwin, Chicago; University of Illinois College of Dentistry, 1912; died September 13; age 72.

Fecheimer, Karl M., Detroit; Detroit College of Medicine Department of Dental Surgery, 1898; died December 8; age 80.

Franklin, Robert Anders, Jackson, Fla.; Baltimore College of Dental Surgery, University of Maryland, 1900; died December 12; age 80.

Friedrich, Francis J., Astoria, Ore.; North Pacific College of Oregon School of Dentistry, 1902; died December 8; age 77.

Gale, Alan L., Los Angeles; University of Southern California School of Dentistry, 1943; died December 12; age 44.

Gawthrop, Paul H., Clearwater, Fla.; Ohio College of Dental Surgery, University of Cincinnati, 1936; died October 21; age 55.

Geiger, Howard W., Bay City, Mich.; University of Michigan School of Dentistry, 1913; died November 26; age 69.

Gillick, William, Clayton, N. Y.; University of Buffalo School of Dentistry, 1907; died December 29; age 80.

Greene, Edward J., Cleveland; University of Louisville School of Dentistry, 1920; died December 9; age 62.

Harper, Charles F., Jersey City, N. J.; died December 26; age 83.

Harrington, Edwin I., Watertown, N. Y.; University of Pennsylvania School of Dentistry, 1914; died December 3; age 64.

Harrison, Albert V., Coral Gables, Fla.; University of Iowa College of Dentistry, 1931; died December 9; age 50.

Harrison, George M., Louisville, Ala.; Atlanta Dental College, 1904; died December 3; age 82.

Hemley, John L., Springfield, Mo.; Western Dental College, 1902; died October 11; age 79.

Heykens, Herman, Knoxville, Iowa; University of Iowa College of Dentistry, 1905; died October 26; age 75.

Hocom, Walter L., Superior, Wis.; Milwaukee Medical College Dental Department, 1905; died December 6; age 77.

Holland, Franklin O., Clarence, Mo.; St. Louis University School of Dentistry, 1919; died November 26; age 71.

Holman, Nicholas H., Jr., Hazleton, Pa.; University of Pennsylvania School of Dentistry, 1924; died December 12; age 57.

Holmes, Wentworth, Newark, N. J.; New York College of Dentistry, 1901; died December 16; age 78.

Hull, Ralph W., Greenfield, Ohio; Cincinnati College of Dental Surgery, 1914; died January 16; age 66.

Hyde, Laron D., Salt Lake City, Utah; North Pacific College of Oregon, School of Dentistry, 1918; died January 2; age 65.

Klie, George D., Hoboken, N. J.; University of Pennsylvania School of Dentistry, 1917; died December 1; age 68.

Laine, Jenni, Brooklyn; died November 29; age 60.

Leake, Karl A., Albuquerque, N. Mex.; University of Denver School of Dentistry, 1926; died November 18; age 70.

Levinson, Hyman, Pittsburgh; University of Pittsburgh School of Dentistry, 1924; died December 4; age 57.

Lotts, Ernest G., Dows, Iowa; University of Iowa College of Dentistry, 1898; died July 3; age 86.

Margulis, Abraham, Bronx, N. Y.; New York College of Dentistry, 1918; died December 1; age 71.

Matthews, Stewart A., Libertyville, Ill.; Chicago College of Dental Surgery, 1916; died January 9; age 63.

McCallum, Alfred E., Des Moines, Iowa; Des Moines College of Dental Surgery, 1906; died September 15; age 81.

Miller, Clarence A., Pendleton, Ore.; died November 25; age 67.

Miller, Olen T., Birmingham, Ala.; Baltimore College of Dental Surgery, University of Maryland, 1914; died November; age 66.

Mingledorff, Joseph L., Fort Valley, Ga.; Southern Dental College, 1906; died November 20; age 82.

Mitchell, Joseph, Long Island City, N. Y.; New York College of Dentistry, 1918; died December 1; age 67.

Morrison, Daniel F., Chester, Ill.; Baltimore College of Dental Surgery, University of Maryland, 1904; died December 17; age 75.

Muehlhauser, Carlyle, Lakewood, Ohio; Western Reserve University School of Dentistry, 1929; died December 23; age 54.

Norton, William A., Thorsby, Ala.; Vanderbilt University School of Dentistry, 1914; died December 17; age 70.

Parish, Robert W., Flint, Mich.; Chicago College of Dental Surgery, 1911; died January.

Peacock, Henry B., Opelika, Ala.; Vanderbilt University School of Dentistry, 1900; died December 16; age 82.

Peirce, J. Frank, Wilmington, Del.; University of Pennsylvania School of Dentistry, 1903; died December 10; age 80.

Perkins, Robert H., Houston, Texas; died November 18; age 58.

Probasco, Roy L., Ackley, Iowa; University of Iowa College of Dentistry, 1912; died November; age 69.

Raith, Charles W., Atlantic City, N. J.; Philadelphia Dental College, 1904; died December 9; age 74.

Reed, Frank M., Kewanee, Ill.; Northwestern University Dental School, 1899; died September 25; age 82.

Rice, Charles V., Chicago; University of Illinois College of Dentistry, 1902; died December 19; age 91.

Root, Reuben T., Orlando, Fla.; New York College of Dentistry, 1894; died November 22; age 87.

Sater, Howard Earl, Lyons, Colo.; University of Denver School of Dentistry, 1909; died November 10; age 71.

Seely, Grant, Denver; University of Denver School of Dentistry, 1901; died November 16; age 88.

Sheridan, Gervase D., Winona, Minn.; Marquette University Dental School, 1928; died December 6; age 52.

Siqveland, Ivar E., St. Paul; Pennsylvania College of Dental Surgery, 1892; died November 30; age 86.

Sklar, Nathaniel, New York; New York University College of Dentistry, 1933; died December 7; age 50.

Smith, George L., Hammond, Ind.; Chicago College of Dental Surgery, 1903; died November 23; age 82.

Smith, Justin C., Lihue, Kauai, T. H.; St. Louis University School of Dentistry, 1919; died November 23; age 69.

Smythe, Clarence A., Bristol, Tenn.; Vanderbilt University School of Dentistry, 1926; died December 7; age 61.

Snipes, William E., Jr., Franklin, Va.; Atlanta-Southern Dental College, 1938; died December 19; age 44.

Stewart, Isaac P., Logan, Utah; Chicago College of Dental Surgery, 1904; died November 21; age 85.

Subler, Leo J., Shelby, Ohio; Ohio State University College of Dentistry, 1913; died December 18; age 69.

Telsey, Jacob, Astoria, N. Y.; College of Dental and Oral Surgery, 1919; died December 9; age 66.

Terry, Kydd H., Columbia, Ga.; Meharry Medical College School of Dentistry, 1913; died December; age 68.

Thorendal, Hugo L., Minneapolis; University of Minnesota School of Dentistry, 1925; died October 28; age 62.

Ursini, Drahomir G., New York; College of Dental and Oral Surgery, 1919; died December 18; age 60.

Utter, Eber H., Portland, Ore.; North Pacific College of Oregon School of Dentistry, 1918; died December 2; age 65.

Warren, Justus M., Sebring, Ohio; Ohio Medical University College of Dentistry, 1904; died December 17; age 80.

Weeks, Edward G., Saginaw, Mich.; University of Michigan School of Dentistry, 1905; died November 27; age 76.

Williamson, George H., Portsmouth, Ohio; Ohio College of Dental Surgery University of Cincinnati, 1898; died October 3; age 82.

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announcements

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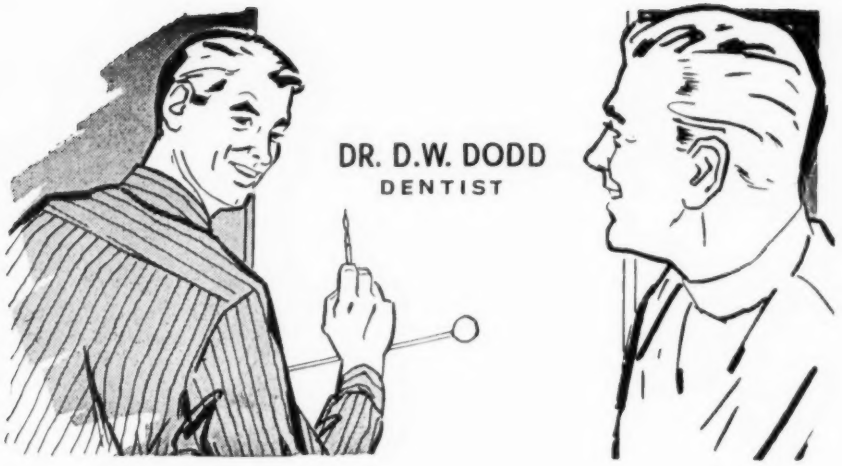
One-Hundredth Annual Session	September 14-18, 1959	New York
One-Hundred and First Annual Session	October 17-20, 1960	Los Angeles
One-Hundred and Second Annual Session	October 16-19, 1961	Philadelphia
One-Hundred and Third Annual Session	October 29-November 1, 1962	Miami Beach, Fla.
One-Hundred and Fourth Annual Session	October 14-17, 1963	Atlantic City, N. J.

MEETINGS OF CONSTITUENT SOCIETIES

State	*Date*	*Place*	*Secretary and Address*
Alabama	Apr. 19-22	Birmingham	C. R. Crook, Professional Center, Montgomery
Alaska	July 13-15	Anchorage	R. D. Livie, 500 K St., Anchorage
Arizona	May 6-9	Scottsdale	W. G. Burke, 15 E. Monroe St., Phoenix
Arkansas	Apr. 12-15	Little Rock	D. M. Hamm, Box 89, Clarksville
California	Apr. 20-22	San Francisco	W. J. Healy, 518 Sutter St., San Francisco 8
S. California	May 4-6	Los Angeles	S. M. Silverman, 903 Crenshaw Blvd., Los Angeles 19
Colorado	Oct. 4-7	Colorado Springs	G. H. Siersma, 724 Republic Bldg., Denver 2
Connecticut	May 13, 14	Hartford	E. S. Arnold, 37 Linnard Rd., W. Hartford
Delaware	June 12, 13	Wilmington	E. J. Truono, 1401 Gilpin Ave., Wilmington 6
Dist. of Columbia			J. F. Keaveny, 1835 Eye St., N.W., Washington 6
Florida	May 17-20	Hollywood	R. P. Groom, 3127 Atlantic Blvd., Jacksonville
Georgia	Oct. 25-28	Atlanta	F. M. Butler, Jr., Bankers Insurance Bldg., Macon
Hawaii	June 14-18	Honolulu	J. H. Dawe, 810 N. Vineyard St., Honolulu
Idaho	June 22-24	McCall	J. R. Olesberg, 214 Third St., Coeur d'Alene
Illinois	May 11-13	Peoria	P. W. Clopper, 632 Jefferson Bldg., Peoria
Indiana	May 18-20	Indianapolis	W. R. Shoemaker, Citizens Bank Bldg., Anderson
Iowa	May 3-6	Des Moines	H. N. Hake, 639 Insurance Exchange Bldg., Des Moines
Kansas	Apr. 26-29	Topeka	F. A. Richmond, Brotherhood Bldg., Kansas City 1
Kentucky	Apr. 5-8	Louisville	A. B. Coxwell, Jr., 2208 Dundee Rd., Louisville 5
Louisiana	Apr. 1-4	Shreveport	J. S. Bernhard, 2515 Line Ave., Shreveport
Maine	June 18-20	Rockland	S. M. Gower, Box 27, Skowhegan
Maryland	May 3-6	Baltimore	C. L. Inman, Jr., Medical Arts Bldg., Baltimore
Massachusetts	May 3-6	Boston	H. E. Tingley, 12 Bay State Rd., Boston 15
Michigan	Apr. 20-22	Grand Rapids	F. Wertheimer, Michigan Dept. of Health, Lansing
Minnesota	Apr. 13-15	Minneapolis	C. V. E. Cassel, 2236 Marshall Ave., St. Paul 4
Mississippi	June 21-24	Biloxi	B. A. Cohen, Box 9981, Jackson 27



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Missouri	May 10-13	Springfield	E. D. Suggett, Merchants Bank Bldg., Jefferson City
Montana	May 7-9	Kalispell	R. C. Ritter, 28 N. Black St., Bozeman
Nebraska	Apr. 26-29	Lincoln	F. A. Pierson, Federal Securities Bldg., Lincoln
Nevada	May 10-12	Las Vegas	O. M. Seifert, 755 Ryland Ave., Reno
New Hampshire	June 21-24	Whitefield	F. E. Williams, 814 Elm St., Manchester
New Jersey	May 12-15	Atlantic City	J. G. Carr, 407 Cooper St., Camden
New Mexico	June 7-10	Santa Fe	W. A. Blueher, 24 Medical Arts Sq., N.E., Albuquerque
New York	May 10-13	Syracuse	C. A. Wilkie, 268 Ashland Pl., Brooklyn 17
North Carolina	May 3-6	Pinehurst	L. H. Butler, Jefferson Bldg., Greensboro
North Dakota	May 3-6	Grand Forks	J. H. Pfister, 419½ Dakota Ave., Wahpeton
Ohio	Oct. 25-28	Cleveland	E. G. Jones, 185 E. State St., Columbus
Oklahoma	Apr. 26-29	Tulsa	L. D. Wright, Osler Bldg., Oklahoma City
Oregon			T. D. Holder, Selling Bldg., Portland
Panama C. Z.			G. E. Lilly, Box 29, Ft. Clayton
Pennsylvania	May 13-16	Harrisburg	M. D. Zimmerman, 217 State St., Harrisburg
Puerto Rico			J. E. Munoz, Box 9023, Santurce
Rhode Island			C. A. Spacagna, 117 Broadway, Providence
South Carolina	May 24-26	Charleston	J. E. Wallace, 1506 Gregg St., Columbia
South Dakota	May 31-June 2	Rapid City	R. E. Decker, Box 308, Parker
Tennessee	May 11-14	Nashville	K. P. Ezell, 116 N. Academy, Murfreesboro
Texas	May 3-6	San Antonio	C. A. McMurray, 3707 Gaston Ave., Dallas 10
Utah	May 21-23	Salt Lake City	R. C. Dalgleish, State Capitol Bldg., Salt Lake City
Vermont	June 26-28	Manchester	E. C. Woods, 36 Washington St., Rutland
Virginia	Apr. 8-11	Roanoke	W. T. McAfee, Colonial National Bank Bldg., Roanoke
Washington	Apr. 6-8	Seattle	G. D. Dore, Jr., 211 Medical Dental Bldg., Seattle 1
West Virginia	July 19-22	White Sulphur Springs	G. N. Casto, Jr., 710½ Lee St., Charleston
Wisconsin	Apr. 27-29	Milwaukee	C. J. Baumann, Jr., 606 W. Wisconsin Ave., Milwaukee
Wyoming	June 18-20	Moran	T. J. Drew, State Office Bldg., Cheyenne

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

State	*Date*	*Place*	*Secretary and Address*
Alabama	June 21-27‡		W. L. Smith, 524 Chestnut St., Gadsden
Alaska	July 7-10*†	Anchorage	R. H. Williams, Box 2122, Juneau
Arizona	June 15‡		W. G. Biddulph, 1611 N. Second Ave., Glendale
Arkansas	June 15-19	Little Rock	G. Cone, 113 S. Pecan St., Osceola
California	June 22 July 27 Aug. 31	Los Angeles San Francisco San Francisco	J. F. Steen, 507 Polk St., San Francisco
Colorado	June 21-27	Denver	R. F. Gilmore, Republic Bldg., Denver 2
Connecticut	June 21-23* June 24, 25†	Boston Bridgeport	A. P. Delfini, 265 Church St., New Haven
Delaware	June 22*† June 23-25*†	Philadelphia Wilmington	J. F. Maguire, 1200 N. Van Buren St., Wilmington
Dist. of Columbia			W. T. Birthright, 1835 Eye St., N.W., Washington
Florida	July 5-16*‡ July 6, 7†‡		R. P. Taylor, Jr., P. O. Box 2913, Jacksonville 3
Georgia	June 1-4*†	Atlanta	W. G. Brown, Blackshear
Hawaii	Aug. 27-30‡		J. Y. Ing, James Campbell Bldg., Honolulu
Idaho	June 29-July 1‡		W. M. Smith, 305 Fort St., Boise
Illinois			R. I. Humphrey, 185 N. Wabash Ave., Chicago
Indiana	June 9-12*†	Indianapolis	C. A. Frech, Gary National Bank Bldg., Gary
Iowa	June 1-5*†	Iowa City	P. A. Hahn, Farmers & Merchants Bank Bldg., Burlington
Kansas	June 1-4‡		G. L. Teall, Box 71, Hiawatha
Kentucky	June 8-11*†	Louisville	J. J. Kelly, 102 W. Madison St., Franklin

The Value of Oatmeal Protein

in the Dietotherapy of Undernutrition

Following periods of catabolic stress—when rehabilitation by diet is especially important—many patients cannot tolerate certain high-nutrition foods, and frequently show an aversion to foods with high-fat content.

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Oatmeal is an outstanding source of natural nutrients well suited for debilitated patients. It ranks highest among whole-grain cereals in content of protein, thiamine, and phosphorus.

The oatmeal serving with milk provides high-quality protein, unimpaired in processing or preparation. It supplies the essential amino acids in proper proportions for biosynthesis, repair, and replenishment of tissue. Oatmeal also provides significant amounts of several B vitamins and minerals important to physiologic rehabilitation.

The smooth, semi-solid texture of oatmeal, the ease of its digestibility, its inviting warmth, and its delicious nut-like taste combine to make it an appealing dish to patients of all ages.

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DENTAL AUTHORITIES

stress the importance of optimal nutrition in the aim toward better dental health during the early growth years. Oatmeal, with its wealth of essential nutrients, not only contributes broadly to good nutrition, but—since its carbohydrate is not readily degraded to simple fermentable sugars—is of virtually no cariogenic influence.

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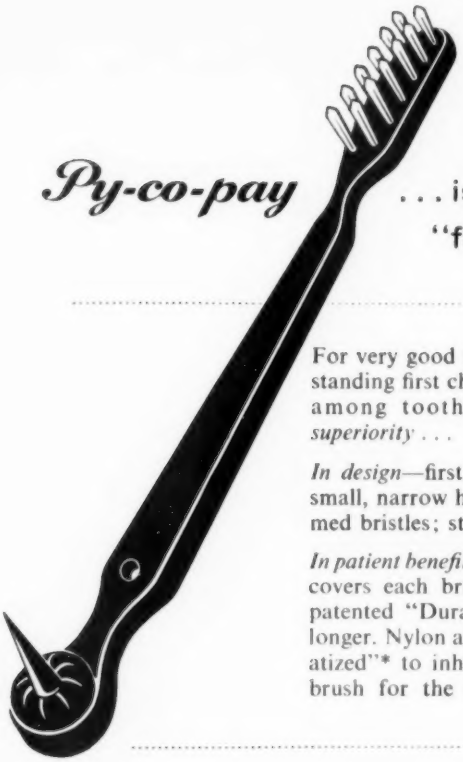
CHICAGO

State	*Date*	*Place*	*Secretary and Address*
Louisiana			A. R. deNux, Marksville
Maine			A. S. Appleby, Box 260, Skowhegan
Maryland	June 8-10	Baltimore	W. D. Burton, 829 Park Ave., Baltimore 1
Massachusetts	June 1-5*‡ June 4, 5†‡		C. R. Williams, 70 Washington St., Salem
Michigan	June 7-13*†	Ann Arbor	J. L. Champagne, 3714 W. McNichols Rd., Detroit 21
Minnesota	June 15-19* June 15, 16†	Minneapolis Minneapolis	E. A. Nelson, 2236 Marshall Ave., St. Paul 4W
Mississippi	June 15-17‡		A. H. Richter, Jr., Aven Bldg., Greenwood
Missouri			R. R. Rhoades, Central Trust Bldg., Jefferson City
Montana			R. O. Betzner, 303 Power Block, Helena
Nebraska	June 8-13*‡		H. E. Weber, Stuart Bldg., Lincoln
Nevada	June 22	Reno	R. Whitehead, Box 1547, Reno
New Hampshire	June 18, 19* June 18†	Boston	S. G. Markos, 8 Renaud Ave., Dover
New Jersey	June 1, 2* June 2† June 11† June 12, 13* June 15, 16* June 16† June 24, 25* June 25†	Philadelphia Philadelphia Teaneck Trenton New York New York Philadelphia Philadelphia	C. J. Schweikhardt, 150 E. State St., Trenton
New Mexico	June 22-25	Santa Fe	G. D. Hastain, Box 1007, Clovis
New York	June 23-26* June 23, 24†	New York Albany Syracuse Buffalo Rochester	D. W. Beier, 23 S. Pearl St., Albany 7
North Carolina	June 22*†	Chapel Hill	J. H. Guion, Doctors Bldg., Charlotte 7
North Dakota	July 13-17	Fargo	G. F. Wirtz, Clinic Bldg., Mandan
Ohio	June 8-10* June 11-13* June 13† June 15, 16*† June 18-20*	Columbus Columbus Columbus Columbus Cleveland	D. E. Bowers, 322 E. State St., Columbus 15
Oklahoma	June 22-24* June 22, 24†	Oklahoma City	W. H. Stephens, Plaza Court Bldg., Oklahoma City
Oregon	June 8-11*†	Portland	F. L. Utter, Pioneer Trust Bldg., Salem
Pennsylvania	Apr. 2, 3* May 25, 26* June 4, 5* June 4† June 17, 18† Nov. 30, Dec. 1* Dec. 2, 3* Dec. 2†	Philadelphia Pittsburgh Pittsburgh Philadelphia Pittsburgh Philadelphia Philadelphia Philadelphia Pittsburgh Philadelphia Pittsburgh Philadelphia Pittsburgh	P. Swanson, 8111 Jenkins Arcade, Pittsburgh
Puerto Rico			J. Mercado C., Comercio St. #452, San Juan
Rhode Island	Jan 26, 27	Providence	F. M. Hackett, 267 Academy Ave., Providence
South Carolina	June 18-20	Columbia	W. J. Brockington, 1508 Washington St., Columbia 1
South Dakota			H. T. Aker, Canton
Tennessee	June 15-19	Memphis	C. R. Aita, Bennie-Dillon Bldg., Nashville
Texas			R. T. Weber, Capital National Bank Bldg., Austin 16
Utah	June 22-27‡		R. W. Fishburn, 4 Professional Center, Brigham City
Vermont	June 22-24‡		P. M. Fitch, Newport
Virginia	June 8-13* June 10, 11†	Richmond	J. M. Hughes, Medical Arts Bldg., Richmond
Washington	June 22‡		T. W. James, 1612 Hewitt Ave., Everett
West Virginia	June 22-24‡		C. C. Cottrill, Box 111, Glen Rogers
Wisconsin	June 8-12*†	Milwaukee	S. F. Donovan, Tomah
Wyoming	June 22-24	Rawlins	E. E. Edwards, Bank of Commerce Bldg., Sheridan

**Dental examination. †Dental hygiene examination. ‡Write to secretary of dental examining board for information on locations of examinations. Most states require applications to be in 30 days prior to examination date*



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MEETINGS OF OTHER ORGANIZATIONS

Name	*Date*	*Place*	*Secretary or Chairman and Address*
Academy of Denture Prosthetics	Apr. 12-17	Louisville, Ky.	W. L. Warburton, Medical Arts Bldg., Salt Lake City 11
American Academy of Dental Medicine	May 14-17	Atlantic City	W. I. Levine, 809 Cathedral St., Baltimore, Md.
American Academy of the History of Dentistry	Sept. 11	New York	M. B. Asbell, 25 Haddon Ave., Camden, N.J.
American Academy of Implant Dentures	Sept. 11-13	New York	A. N. Cranin, 2120 Ocean Ave., Brooklyn 29
American Academy of Oral Pathology	Apr. 17-19	Minneapolis	R. J. Gorlin, School of Dentistry, University of Minnesota, Minneapolis 14
American Academy of Oral Roentgenology	Sept. 12	New York	T. S. Grant, University of California Medical Center, San Francisco 22
American Academy of Pedodontics	Sept. 9-11	New York	W. E. Cody, 1325 E. 16th Ave., Denver
American Academy of Periodontology	Sept. 11-13	New York	C. E. Chamberlain, 1101 N. North St., Peoria, Ill.
American Association for Cleft Palate Rehabilitation	Apr. 30-May 2	Philadelphia	D. C. Spriestersbach, Dept. of Otolaryngology, University Hospitals, Iowa City
American Association of Dental Editors	Sept. 12	New York	S. Epstein, 260 Santa Clara Ave., San Francisco
American Association of Dental Examiners	Sept. 11, 12	New York	C. J. Schweikhardt, 150 E. State St., Trenton 8, N.J.
American Association of Industrial Dentists	Apr. 27-29	Chicago	E. R. Aston, Pennsylvania Dept. of Health, P.O. Box 90, Harrisburg, Pa.
American Association of Orthodontists	May 4-7	Detroit	E. E. Shepard, 8230 Forsyth Blvd., St. Louis
American Association of Public Health Dentists	Sept. 13	New York	C. L. Howell, 1330 W. Michigan St., Indianapolis
American Board of Oral Surgery	Apr. 2-6	Chicago	L. M. FitzGerald, Roshek Bldg., Dubuque, Iowa
American Board of Orthodontics	Apr. 27-May 2	Detroit	W. L. Wylie, University of California, The Medical Center, San Francisco
American Board of Pedodontics	Dec. 14-17	Chicago	R. L. Ireland, College of Dentistry, University of Nebraska, Lincoln 8, Neb.
American College of Dentists	Sept. 11-14	New York	O. W. Brandhorst, 4236 Lindell Blvd., St. Louis
American Dental Assistants Association	Sept. 14-18	New York	M. L. Martin, First National Bank Bldg., La Porte, Ind.
American Dental Assistants Certification Board	May 13-17 Oct. 14-18		D. Perry, 6729 Gamewell Rd., Jacksonville 11, Fla.
American Dental Hygienists' Association	Sept. 14-18	New York	M. E. Swanson, 100 E. Ohio St., Chicago
American Dental Society of Anesthesiology	Sept. 12, 13	New York	H. A. Sultz, 1275 Delaware Ave., Buffalo 9
American Dental Society of Europe	July 5-8	Stockholm, Sweden	J. P. Molony, 110 Harley St., London W.1, England
American Denture Society	Sept. 11, 12	New York	V. L. Steffel, College of Dentistry, Ohio State University, Columbus, Ohio
American Society of Dentistry for Children	Sept. 11-13	New York	R. E. McDonald, School of Dentistry, Indiana University, 1121 W. Michigan St., Indianapolis
American Society of Oral Surgeons	Sept. 9-12	New York	D. C. Trexler, 840 N. Lake Shore Dr., Chicago 11
Ark-La-Tex Dental Congress	Aug. 17	Shreveport, La.	G. Poulos, State National Bank Bldg., Texarkana, Ark.
Association of American Women Dentists	Sept. 14	New York	G. Cramer, 99 W. Broadway, Salem, N.J.
Austrian Dental Congress	May 20-23	Graz, Austria	R. Trauner, Zahnklinik und Kieferstation Graz, Auenbruggerplatz 12 (Landeskrankenhaus) Austria
Berkshire Conference (Tenth)	June 14-18	Lenox, Mass.	I. Glickman, Tufts University School of Dental Medicine, 136 Harrison Ave., Boston 11
British Dental Association	May 25-29	Torquay, England	Secretary, British Dental Association, 13 Hill St., Berkeley Square, London W.1
Canadian Dental Association	June 21-24	Halifax	D. W. Gullett, 234 St. George St., Toronto 5 Canada

you've heard the question...

why "white" bread?

why not whole wheat?

Sometimes . . . you hear the question—why "white" bread? Why not whole wheat or a specialty loaf containing darker fractions of the wheat berry?

There are reasons:

First, most people eat "white" bread, buns, biscuits and other products of enriched flour for the most compelling of all reasons. They like them. They prefer the appearance, flavor and texture of enriched products to whole wheat.

Authorities consider enriched and whole wheat products to be nutritional equivalents in planning good diet. Enrichment adds niacin, riboflavin, thiamine and iron to bread and flour without adding calories or cost. Enrichment is in large measure responsible for the generous supplies of these nutrients in national diet. Made most frequently with milk or milk solids, today's breadstuffs also contribute calcium as well. As for protein, the amino acid composition of all wheat products becomes complete and adequate when eaten—as they usually are—with proteins of animal origin.

Which leaves only calories. And if you check calorie tables, you will find breadstuffs among foods relatively low in caloric values, with insignificant differences between enriched and whole wheat. Other nutrients, for which Recommended Daily Dietary Allowances are specified by the National Research Council, are found in neither enriched nor whole wheat products—but come most easily from other foods in a balanced diet. Finally, no other one popular food contributes as much at so low a cost as breadstuffs.

If you still ask, But why "white" bread? . . . then consider further: The absence of roughage in enriched bread enables sensitive digestive tracts to handle it without needless irritation. Since roughage tends to speed the passage of food, there may be even more nourishment actually available in diet with enriched rather than whole wheat products.

But in normal diet—eat either enriched or whole wheat, or both for variety, as you prefer.

Citations in support of the above statements would fill several pages. If you still have questions of enriched versus whole wheat, may we send you a free copy of the authoritative booklet, "Role of Wheat and Wheat Products in Human Nutrition"? This reprint of an article from "Physiological Reviews" provides a broad over-view of the subject. Please write or use the coupon.

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working for a healthier America through nutrition

Name	*Date*	*Place*	*Secretary or Chairman and Address*
Chicago Dental Society	Feb. 7-10	Chicago	K. S. Richardson, 30 N. Michigan Ave., Chicago
Congress of Dental Science	May 6-10	Knokke-sur-Mer, Belgium	A. G. Vermeersch, 8, Place Foch, Louvain, Belgium
Council on Dental Education, Dental Aptitude Tests	Apr. 17, 18		S. Peterson, 222 E. Superior St., Chicago 11
European Orthodontic Society, Thirty-fifth Congress	July 6-11	Marseille, France	J. Autissier, 3, Bd Paul Doumer, Marseille, France
Federation Dentaire Internationale, 47th Annual Meeting	Sept. 12-19	New York	G. H. Leatherman, 35 Devonshire Place, London W.1, England
French Congress of Stomatology (Sixteenth)	Oct.	Paris	R. Bataille, 43 Rue de la Chaussee d'Antin, Paris
German Dental Congress (Fourteenth) and 100th Anniversary Meeting, German Society of Dentistry	Sept. 3-6	Berlin	R. Braun, Universitaetstrasse 73, Koeln-Lindenthal, Germany
German Orthodontic Society	May 24-27	Frankfort, Germany	R. Ritter, Universitaetsklinik and Poliklinik fur Mund-Zahn- und Kieferkranke, Heidelberg, Germany
German Society for Maxillo-facial Surgery, Ninth Session	July 8-10	Dusseldorf, Germany	A. Rehrmann, Westdeutsche Kieferklinik, Himmelgeisterstrasse 152, Dusseldorf, Germany
German Society of Prosthetics	May 28-30	Frankfort, Germany	D. Jantzen, Essen, Krupp Zahnklinik, Germany
Greater Pittsburgh Meeting	Oct. 6-8	Pittsburgh	H. D. Butts, Jr., Jenkins Bldg., Pittsburgh
International Academy of Oral Dynamics	Sept. 12, 13	New York	J. T. McSweeney, 140 E. 80th St., New York
International College of Dentists	Sept. 12, 13	New York	H. O. Westerdahl, 4829 Minnetonka Blvd., Minneapolis
International Dental Show (Fourteenth)	May 27-30	Frankfurt	Verband der Deutschen Dentalindustrie e. V., Frankfurt/M., Hanauer Landstrasse 139-145
Japan Dental Association	Apr. 26-28	Tokyo, Japan	T. Kashima, 4-6 Kudan Chiyoda-ku, Tokyo
National Association of Seventh-Day Adventist Dentists	Sept. 11-13	New York	G. H. Curtis, Box 101, Loma Linda, Calif.
National Board of Dental Examiners	Apr. 2, 3 Nov. 30, Dec. 1		G. J. Casey, 222 E. Superior St., Chicago 11
National Dental Association	Aug. 16-20	Cincinnati	E. N. Jackson, P.O. Box 197, Charlottesville, Va.
Northeastern Society of Periodontists	Apr. 10	New York	B. Wasserman, 730 Fifth Ave., New York 19
Northwest Academy of Dental Medicine	May 24-28	Sun Valley, Idaho	G. Underwood, Selling Bldg., Portland 5, Ore.
Philippine Dental Association	May 13-17	Manila	D. G. Santos, P.O. Box 1142, Manila
Scandinavian Dental Association (Thirty-second Congress)	July 2-4	Copenhagen, Denmark	Secretariat, Osterbrogade 4, Copenhagen, Denmark
Southeastern Society of Oral Surgeons	May 7-9	Gatlinburg, Tenn.	P. B. Whittington, Jr., Medical Arts Bldg., Greensboro, N.C.
Southern Academy of Periodontology	June 11-13	Gatlinburg, Tenn.	J. R. Owings, 7 Medical Ct., Greenville, S.C.
Southwest Society of Periodontists	May 1, 2	San Antonio, Texas	J. H. Swindle, Jr., P.O. Box 3096 Westview Station, Waco, Texas
U.S.C. Dental Study Group of Mexico, Twelfth Annual Seminar	May 17-21	Acapulco, Mex.	C. J. Cornish, Paseo de la Reforma 510-601, Mexico 6, D.F.

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Dental schools

ALABAMA
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University of Alabama
1919 7th Avenue, South
Birmingham 3, Alabama

CALIFORNIA
School of Dentistry
College of Physicians and Surgeons
344 Fourteenth Street
San Francisco 3, California

School of Dentistry
University of California
University Medical Center
San Francisco 22, California

School of Dentistry
University of Southern California
925 West Thirty-fourth Street
Los Angeles 7, California

School of Dentistry
College of Medical Evangelists
Loma Linda, California

DIST. OF COLUMBIA
School of Dentistry
Georgetown University
3900 Reservoir Road, N.W.
Washington 7, D. C.

College of Dentistry
Howard University
600 W. Street, N. W.
Washington 1, D. C.

GEORGIA
School of Dentistry
Atlanta Southern Dental College
Emory University
106 Forrest Avenue, N.E.
Atlanta 3, Georgia

ILLINOIS
Chicago College of Dental Surgery
Loyola University
1757 West Harrison Street
Chicago 12, Illinois

The Dental School
Northwestern University
311 East Chicago Avenue
Chicago 11, Illinois

College of Dentistry
University of Illinois
808 South Wood Street
Chicago 12, Illinois

INDIANA
School of Dentistry
Indiana University
1121 West Michigan Street
Indianapolis 2, Indiana

IOWA
College of Dentistry
State University of Iowa
Dental Building
Iowa City, Iowa

KENTUCKY
School of Dentistry
University of Louisville
129 East Broadway
Louisville 2, Kentucky

LOUISIANA
School of Dentistry
Loyola University
6363 St. Charles Avenue
New Orleans 18, Louisiana

MARYLAND
Baltimore College of Dental Surgery
The Dental School
University of Maryland
618 West Lombard Street
Baltimore 1, Maryland

MASSACHUSETTS
Harvard School of Dental Medicine
188 Longwood Ave.
Boston, Massachusetts

School of Dental Medicine
Tufts University
136 Harrison Avenue
Boston 11, Massachusetts

MICHIGAN
School of Dentistry
University of Detroit
630 East Jefferson Avenue
Detroit 26, Michigan

School of Dentistry
University of Michigan
Ann Arbor, Michigan

MINNESOTA
School of Dentistry
University of Minnesota
Washington Ave. and Union St., S.E.
Minneapolis 14, Minnesota

MISSOURI
Kansas City-Western Dental College
School of Dentistry
The University of Kansas City
1108 East Tenth Street
Kansas City 6, Missouri

School of Dentistry
St. Louis University
1556 Caroline Street
St. Louis 4, Missouri

School of Dentistry
Washington University
1559 Scott Avenue
St. Louis 10, Missouri

NEBRASKA
School of Dentistry
The Creighton University
26th and California Streets
Omaha 2, Nebraska

College of Dentistry
University of Nebraska
Lincoln 8, Nebraska

NEW JERSEY
School of Dentistry
Fairleigh Dickinson University
Teaneck, New Jersey

College of Dentistry
Seton Hall University
Jersey City Medical Center
Jersey City, New Jersey

NEW YORK
School of Dental and Oral Surgery
Columbia University
630 West 168th Street
New York 32, New York

College of Dentistry
New York University
421 First Ave.
New York 10, New York

School of Dentistry
University of Buffalo
3435 Main Street
Buffalo 14, New York

NORTH CAROLINA
School of Dentistry
The University of North Carolina
Chapel Hill, North Carolina

OHIO
College of Dentistry
The Ohio State University
Columbus 10, Ohio

School of Dentistry
Western Reserve University
2165 Adelbert Road
Cleveland 6, Ohio

OREGON
The Dental School
University of Oregon
611 S.W. Campus Dr., Sam Jackson Park
Portland 1, Oregon

PENNSYLVANIA
School of Dentistry
Temple University
3223 North Broad Street
Philadelphia 40, Pennsylvania

Thomas W. Evans Museum & Dental
Institute School of Dentistry
University of Pennsylvania
4001 Spruce Street
Philadelphia 4, Pennsylvania

School of Dentistry
University of Pittsburgh
Thackeray and O'Hara Streets
Pittsburgh 13, Pennsylvania

TENNESSEE
School of Dentistry
Meharry Medical College
Nashville 8, Tennessee

College of Dentistry
University of Tennessee
847 Monroe Avenue
Memphis 3, Tennessee

TEXAS
College of Dentistry
Baylor University
800 Hall Street
Dallas 10, Texas

The University of Texas
Dental Branch
6516 John Freeman Ave.
Houston 25, Texas

VIRGINIA
School of Dentistry
Medical College of Virginia
12th and Clay Streets
Richmond 19, Virginia

WASHINGTON
School of Dentistry
University of Washington
Health Sciences Building
Seattle 5, Washington

WEST VIRGINIA
School of Dentistry
West Virginia University
Morgantown, West Virginia

WISCONSIN
School of Dentistry
Marquette University
604 North Sixteenth Street
Milwaukee 3, Wisconsin

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School of Dentistry
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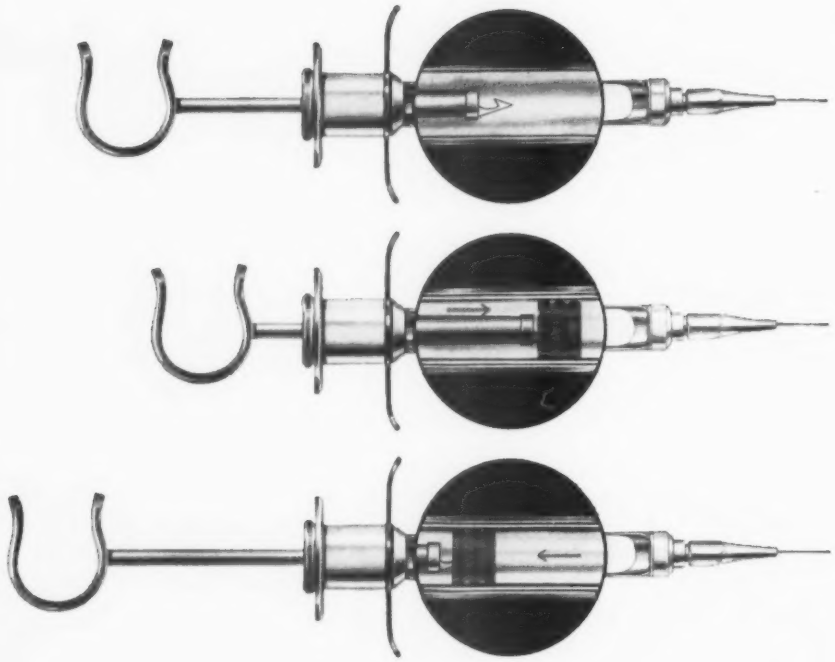

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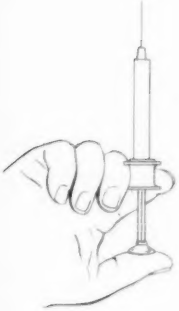

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3 of 13 New Mosby Dental Books & Editions

A Selection of 13 New Mosby Releases for First Half of '59

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Edited by Gustav O. Kruger, D.D.S.

Gives You a Detailed Presentation of Today's Most Accepted Techniques

Designed to fill the need for a short, concise book on oral surgery, this practical new volume presents in detail all of the techniques that are being used today. While most of these ideas may be found elsewhere in the literature, many are not yet included in other oral surgery texts. Edited by Gustav O. Kruger, D.D.S. and written by 20 competent collaborators representing a cross section of the best oral surgeons in the United States today, this new book provides up-to-date coverage in all areas of oral surgery from the changing concepts of technique and therapy to profusely illustrated methods of surgery.

Edited by GUSTAV O. KRUGER, B.S., A.M., D.D.S., F.A.C.D., Professor of Oral Surgery, Georgetown University, Washington, D.C. Written by 20 collaborators. Ready May, 1959. Approx. 600 pages, 6¾" x 9¾", approx. 489 illustrations. About $12.00.

2nd Edition Coming in May!

Swenson-Terkla PARTIAL DENTURES

Helps You Add to Your Skills in Diagnosis, Surveying and Design

Completely revised and rearranged in a more logical order the new 2nd edition of this well-known guidebook has been greatly expanded to help you add new skills to your armamentarium. You'll find the sections on diagnosis, prognosis and treatment planning have been broadened in this edition. The chapter on Planning, Designing and Surveying has been reorganized and increased in size. In Part II, devoted to the actual construction of partial dentures, you'll find an entirely new sequence of helpful illustrations. The author gives the same detailed step-by-step guidance to the construction of partial dentures in this revision that proved so popular in the previous edition.

By MERRILL G. SWENSON, D.D.S., F.I.C.D., F.A.D.P.; and LOUIS G. TERKLA, D.M.D. Ready May, 1959, 2nd edition, approx. 425 pages, 6¾" x 9¾", approx. 403 illustrations.

4th Edition Coming in May!

Swenson COMPLETE DENTURES

Describes and Illustrates Every Technical and Theoretical Advance

Not only does this new 4th edition present all the major technical advances recently made in complete denture construction, give comprehensive coverage of principles, and demonstrate new materials and devices, but it simplifies and clarifies your thinking in a way never before available in a book of this kind. New black and white illustrations and 10 color plates give you better understanding of all steps of technical procedures. In many phases of denture construction additional information is included which you can use in full or in part.

By MERRILL G. SWENSON, D.D.S., F.I.C.D., F.A.D.P., Professor of Denture Prosthesis, University of Oregon School of Dentistry. Ready May, 1959, 4th edition, approx. 745 pages, 6¾" x 9¾", 856 illustrations.

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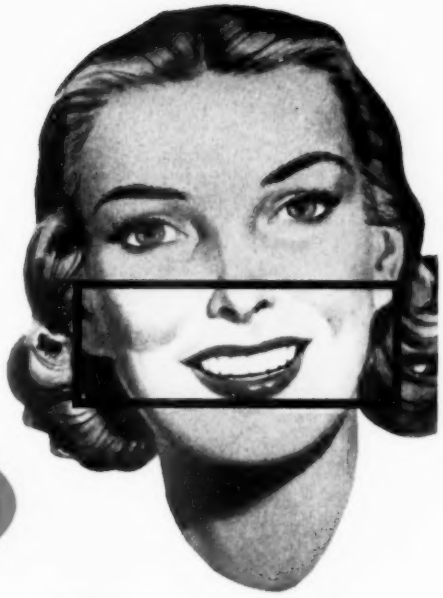

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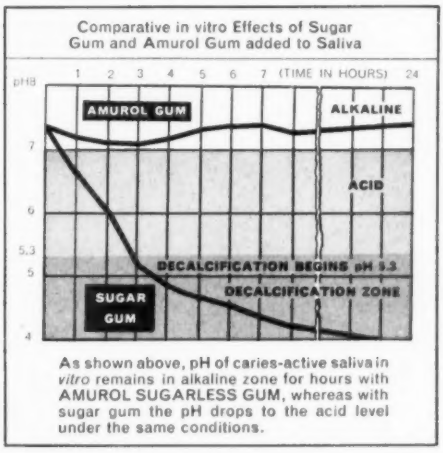

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The Principles and Practice of Dental Surgery,
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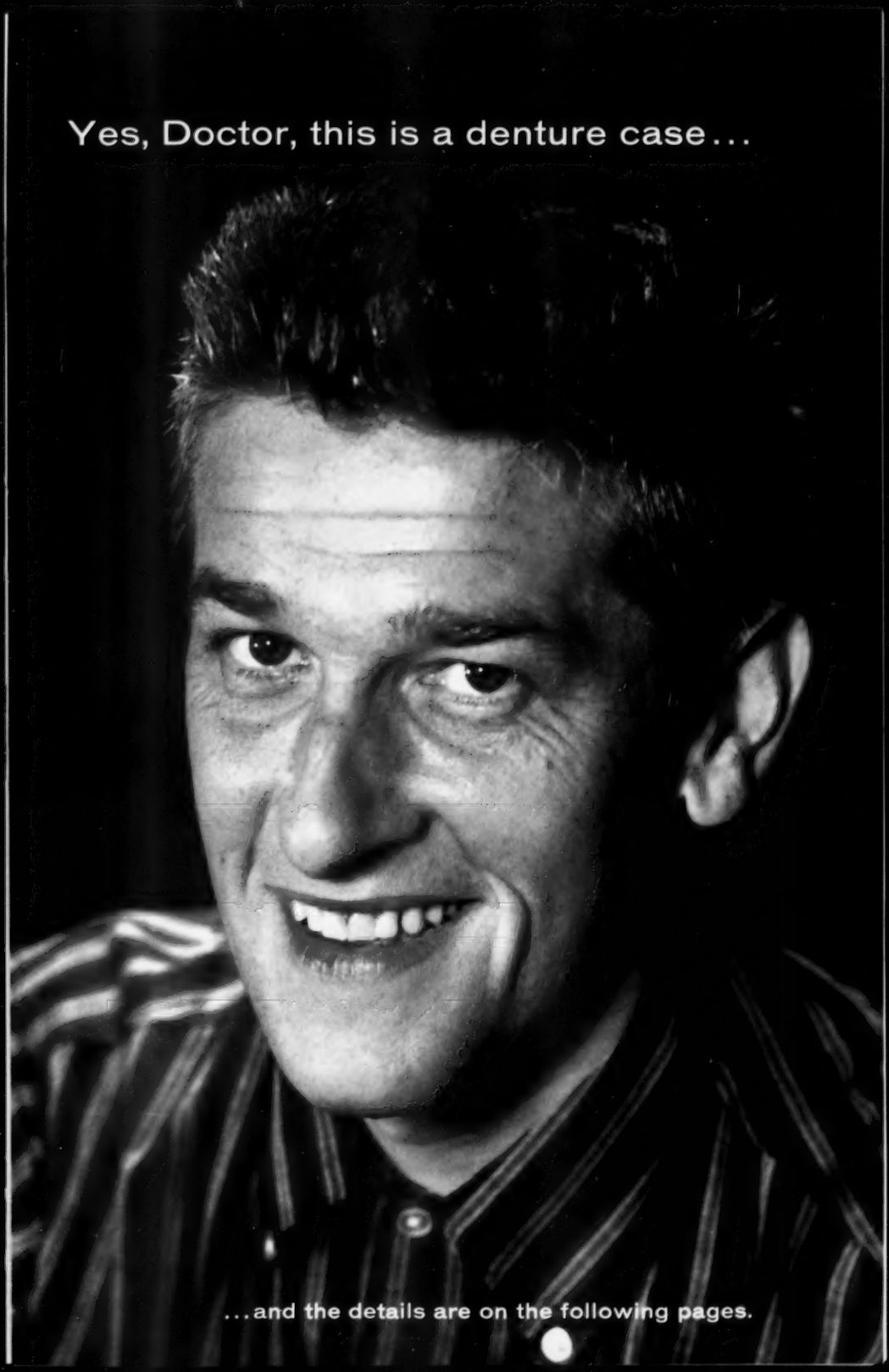
Journal of the American Dental Association,
Chicago, June, 1958


Yes, Doctor, this is a denture case...
...and the details are on the following pages.

PROBLEM

to create an individualized denture with such a high degree of naturalness that the patient will be completely self-confident in "close up" public appearances.

This patient's natural teeth bore certain basic relationships to the overall facial appearance. They seemed to "go with," and be a part of, the character and individuality of the face. In the four aspects of form, size, color and arrangement, they were *in harmony with* the form, size, complexion and anatomy of the face.

In creating a denture which simulates the lifelike quality of the natural mouth, the dentist seeks to achieve a harmony of the artificial with the real. And since the form, size, color and arrangement of the *artificial* must blend with the corresponding aspects of the *real,* the dentist studies the patient's face for the clues by which he will select and arrange the teeth in the denture.

An examination of the patient in frontal view, as shown above, furnishes many of these clues and gives the dentist several general indications of the steps to be followed. Note the outline face *form,* which is severely tapering; the face *size,* and the relation of width to length; the face *color* or complexion, which is ruddy and youthful; and, lastly, note the overall *character* of the face—its definite asymmetry with marked dominance of the left side, its flatness of cheek plane, severe angularity and its general ruggedness and masculinity.

These characteristics, which in sum total give individuality to the patient's face and make him recognizable as a human entity different from any other, have been used as a guide in the construction of his denture. A brief description of how this was accomplished is on the following page.

Essential to fine esthetic results . . .

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BIOFORM® TEETH

THE DENTISTS' SUPPLY COMPANY OF NEW YORK YORK, PENNSYLVANIA

SOLUTION

Skillful use of Trubyte Bioform Teeth and the Trubyte Bioform System of Tooth Selection and Arrangement help the dentist achieve esthetic excellence and complete patient satisfaction.

HARMONY OF FORM

The outline face form is tapering. Harmony of tooth form with face form is achieved by selecting Trubyte Bioform Mould 42G, a long, tapering tooth.

HARMONY OF SIZE

The tooth size of the centrals is approximately 8.5 mm. in width, following the one-to-sixteen ratio of tooth size to face size.

HARMONY OF COLOR

The patient's complexion is ruddy and high-colored, typical of the young, vigorous male. The shade selected for the centrals is Trubyte Bioform B65. A natural effect is achieved by "mixing" shades, using B69 for the laterals and B67 for the cuspids.

HARMONY OF ARRANGEMENT

The basic arrangement follows the asymmetry of the patient's face and recreates the left side dominance.

The left side dominance is accentuated and visual interest added by "lapping" the left lateral over the left central. The teeth are individually ground at the distal incisal angles to accentuate the tapering in the arrangement. A mesial interproximal stain in the right central contributes individuality to the denture and simulates a natural tooth condition. Cuspids are ground for a more youthful appearance. Occlusal staining of the posteriors recreates the effect of amalgam restorations.

the Trubyte Bioform System provides these invaluable aids to help you build your prosthetic practice through individualized esthetics

THE PRACTICE OF ESTHETICS

THE TRUBYTE BIOFORM PROFESSIONAL DENTURE SERVICE UNIT

An effective ethical practice-building aid which consists of:

TRUBYTE BIOFORM MOULD GUIDE

Enables you to verify your mould selection immediately when your patient is in the chair; the unique 7-drawer design facilitates selection of teeth which harmonize with the patient's face form; contains all the available upper and lower anterior moulds of Trubyte Bioform Teeth.

TRUBYTE BIOFORM SHADE SELECTOR ASSORTMENT

Enables you to verify your shade selection in the mouth of the patient; provides an easy and accurate method of shade selection for full and partial dentures.

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An accurate guide to help you select the Trubyte Bioform Teeth which harmonize with the patient's face form and size.

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A flexible selection rim which provides a preview of finished denture; an invaluable aid to preliminary tooth selection and arrangement.

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Full color, 35 mm. slides of "before and after" denture cases. Shows your patient what modern prosthetic dentistry can accomplish; helps prepare the patient psychologically and emotionally; and is an invaluable early step toward the complete success of the finished restoration.

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is a small, compact and convenient-to-use table viewer, only 6″ x 6″ in size with an optical system which projects 35 mm. slides onto a 2″ x 2″ screen for easy viewing. It is ideal for patient education—for showing "before and after" studies of all types of dental treatment—and is particularly useful for complete and partial denture presentations where it is desirable to show the full face of the patient as well as mouth close-ups.

THE TRUBYTE COLOR PRINT SERVICE

consists of a number of specially selected photographic studies of the "before and after" complete denture cases illustrated in the slide library catalog. 8 x 10 portrait color prints and 5 x 7 mouth close-up studies are available in portrait-type mounts.

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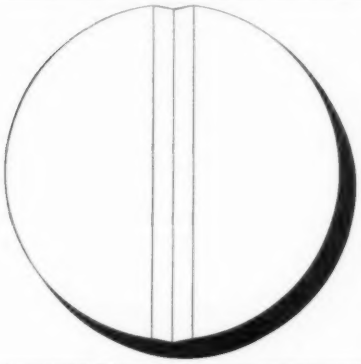

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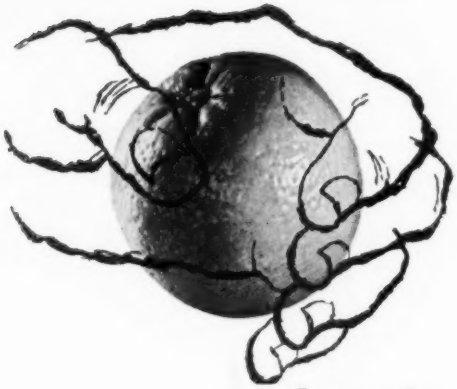

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grape	9 glasses
pineapple	3-4 glasses
prune	50 glasses

†Data calculated from: Watt, B. K. et al., U.S. Dept. Agric. Handbook No. 8, 1950; and Burger, M. et al. Agr. & Food Chem. 4:418, 1956.

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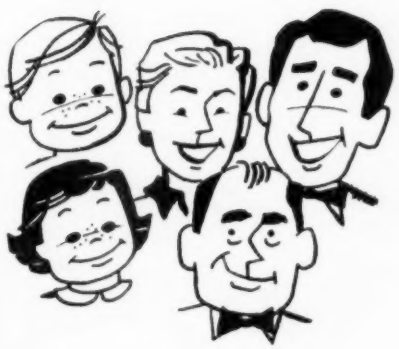

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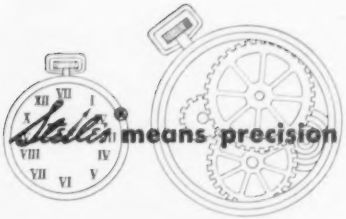

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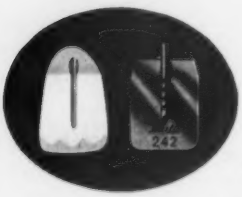

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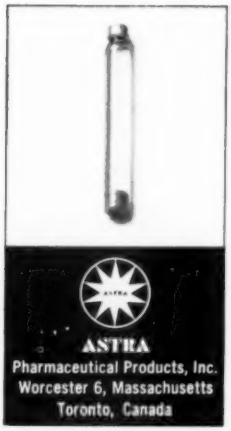

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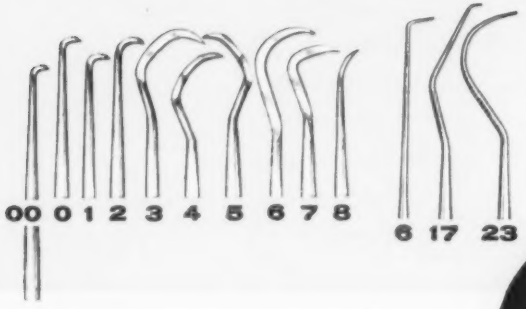

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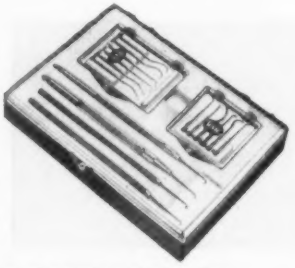

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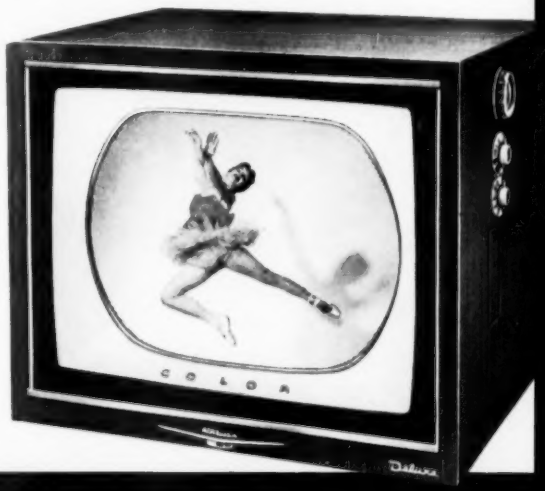

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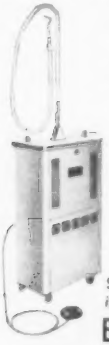

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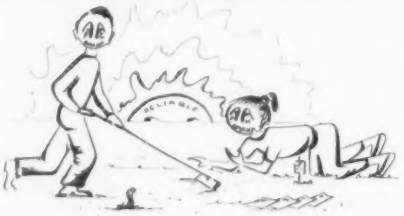

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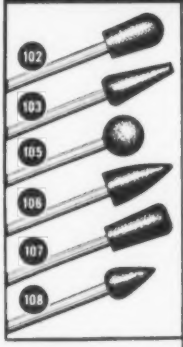

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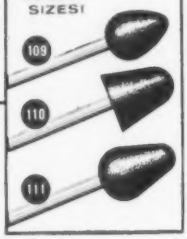

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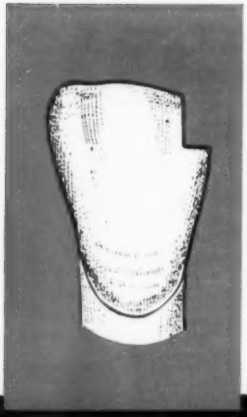

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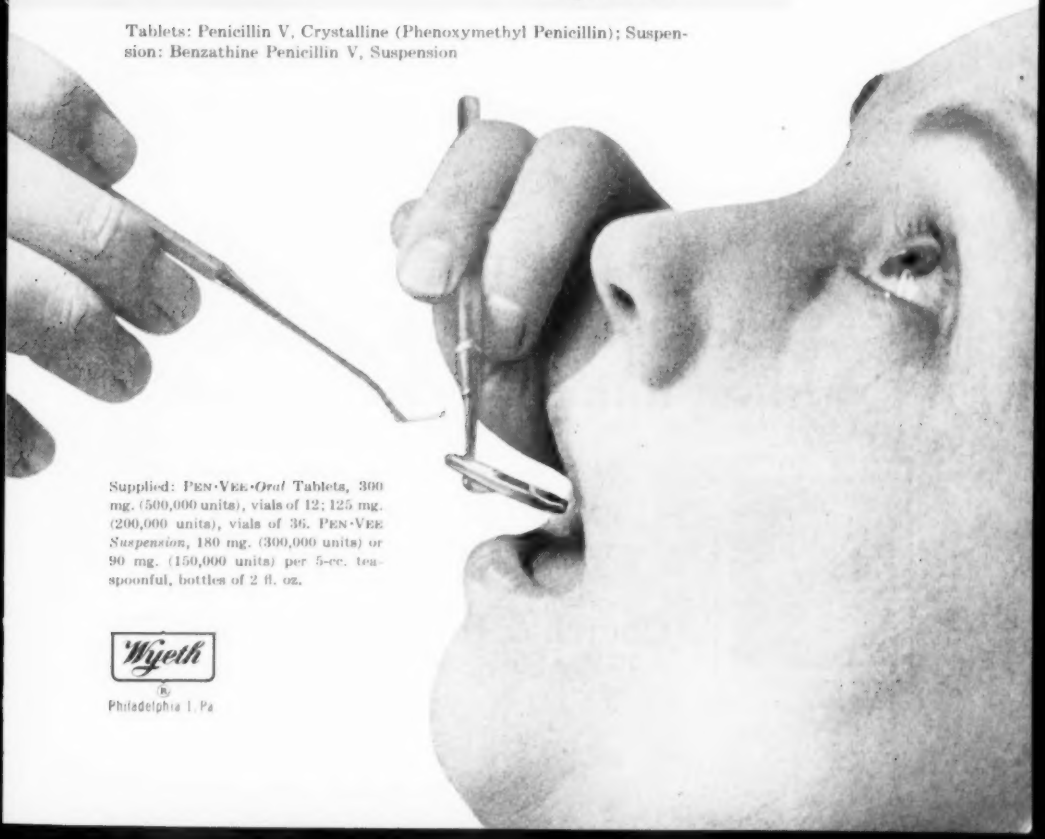

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